AVIATION WEEK

50 CENTS

HOW TO "WRING OUT" AUTOMATIC CONTROLS FOR AIRCRAFT

That, in effect, is what these engineers are doing—by means of mathematical equations fed into Honeywell's analog computing equipment, part of which is shown above.

Simulated flight testing of automatic controls in this manner is constantly being done by Honeywell aero research men because it makes actual flight testing easier and less costly.

Use of the analog computer is just one example of the kind of research being done at Honeywell to help build better automatic controls for airplanes. Research activities in the fields of jet engine, temperature and fire control, nonlinear mechanics, digital data operation and control, as well as many others are constantly being carried out.

We expect to expand our research program in the years ahead—because *automatic control* is such an important part of aviation progress. And *automatic control* is Honeywell's business.

AERONAUTICAL DIVISION

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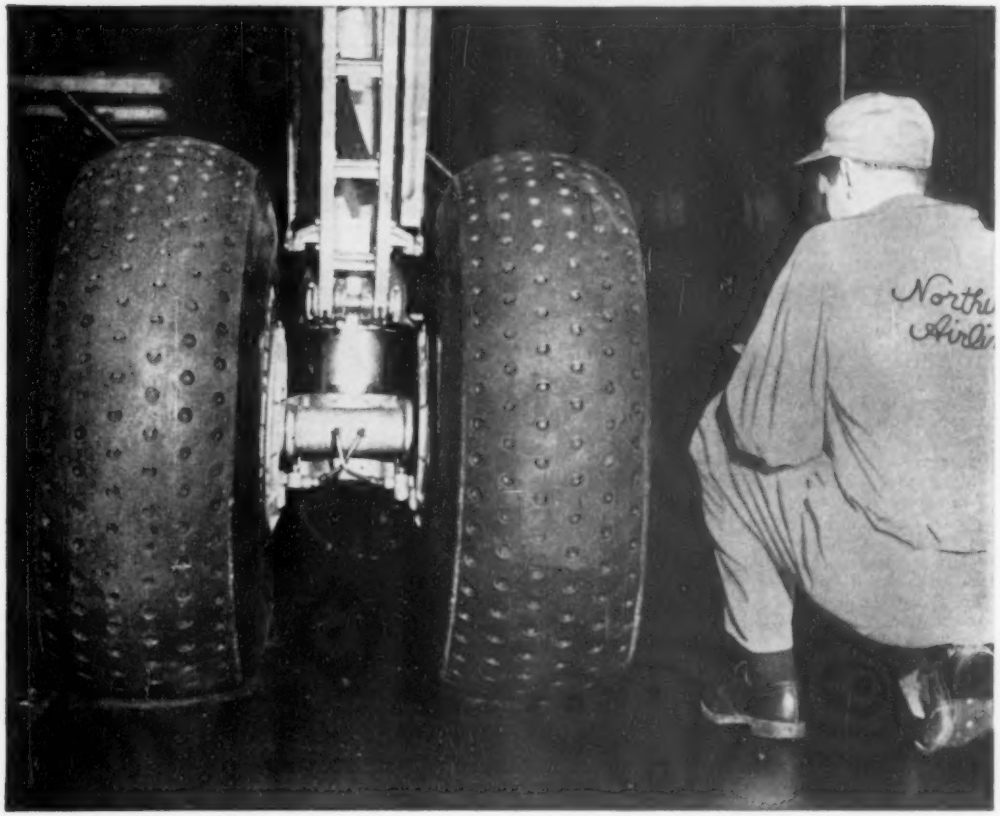
B.F.Goodrich



20% more landings with new B. F. Goodrich dimpled tire

THE NEW B. F. GOODRICH airplane tire has a stronger cord body and new wear-resisting tread with dimple-like indentations in the rubber. These dimples provide better distribution of the tire load and reduce exposure to tread cutting. The tread design is a complete departure from conventional ribbed treads.

Northwest Airlines has complete performance data on all types of tires. When B. F. Goodrich introduced the new tire, it was quickly added to their test program. As comparative records of dimpled tires began to come in, the results were impressive. Northwest engineers found it gave them 20% more landings per tire than the next best tire tested, recommended adoption of the new tire as standard equipment.

Northwest is the ninth airline to report a switch to the dimpled tire. Others who have tested and are using dimpled tires are Trans-Texas, Braniff, Capital, Continental, Empire, Mid-Continent, National, and West Coast.

B. F. Goodrich is now producing the dimpled tire in seven sizes. The new, longer wearing tire is another example of BFG's leadership in rubber research and engineering. Other B. F. Goodrich products for aviation include wheels and brakes, heated rubber, De-Icers, Avtrim, Plastilock adhesives, Pressure Sealing Zippers, inflatable seals, fuel cells, Rivnuts, accessories. *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

B.F.Goodrich
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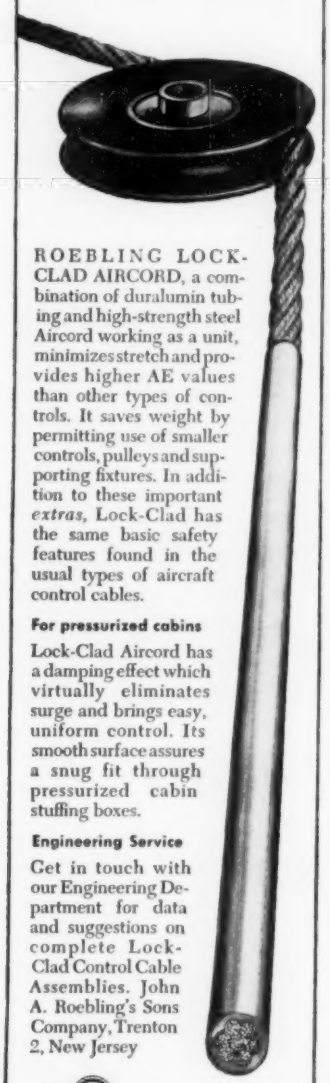
Roebling Lock-Clad assures highest efficiency and safety



ROEBLING LOCK-CLAD AIRCORD, a combination of duralumin tubing and high-strength steel Aircord working as a unit, minimizes stretch and provides higher AE values than other types of controls. It saves weight by permitting use of smaller controls, pulleys and supporting fixtures. In addition to these important *extras*, Lock-Clad has the same basic safety features found in the usual types of aircraft control cables.

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Lock-Clad Aircord has a damping effect which virtually eliminates surge and brings easy, uniform control. Its smooth surface assures a snug fit through pressurized cabin stuffing boxes.

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ROEBLING

Aviation Week

ABP Member ABC

Volume 56 — **May 5, 1952** — **Number 18**

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Beechcrafts are used to check herds, fences, distant acreage. Records show they've saved many a harvest when equipment parts were needed pronto. And with a Beechcraft, there's no such thing as an "isolated" farm. This Model C35 Beechcraft Bonanza cruises at 175 mph, is right at home on small, rough fields.

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All listed diameters—hex and internal wrenching types. AN specifications.

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Close tolerance, high strength, flush head type.

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Superior safety nuts. Sizes from ¼" to 1½".

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INFORMATION UPON REQUEST. ADDRESS DEPARTMENT 678.

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FLEXLOC SELF-LOCKING NUTS, REGULAR TYPE

Both stop and lock nuts. One piece construction, resilient segments lock positively with uniform torque. Aircraft approval, sizes #4 to 1¼" inclusive. Regular steel FLEXLOC approved for temperatures to 550°F.

FLEXLOC SELF-LOCKING NUTS, THIN TYPE

Less than regular height, yet conform to accepted standards. Every thread, including the locking threads, carries its share of load. Have all regular FLEXLOC features, but save weight and height. Aircraft approval, #6 to 1¼".

FLEXLOC EXTERNAL WRENCHING NUTS

Incorporate famous FLEXLOC self-locking principle and one-piece, all-metal construction. Latest NAS specifications. Sizes from ¼" to 1½" NF Thread Series. Approved for temperatures to 550°F.

INFORMATION ABOUT FLEXLOC ON REQUEST. ADDRESS DEPARTMENT 51,

AIRCRAFT PRODUCTS DIVISION

STANDARD PRESSED STEEL CO., JENKINTOWN 3, PENNSYLVANIA

NEWS DIGEST

DOMESTIC

PAA Stratocruiser bound for New York from Rio de Janeiro and Buenos Aires was missing last week with 41 passengers and crew of nine. Last reported position was over prairie and jungle section in central Brazil.

High-frequency radio channel has been assigned to California Central Airlines, the first scheduled air carrier to get one under recently adopted international agreement for standardized worldwide frequencies.

Civil aircraft exports during March of planes weighing 6,000 lb. and less totaled 27 valued at $142,254.

Bell 47-D1 helicopter has been purchased by New York City Police Dept., bringing its copter fleet to four. Two more Bells are to be delivered to NYPD by the end of 1952.

Mid-Atlantic collision of U.S. aircraft carrier Wasp and destroyer-minesweeper Hobson on night of Apr. 26 resulted in sinking of smaller craft with reported loss of 174 of its crew of 235. No carrier casualties were reported. The Wasp, which was on its way to the Mediterranean, turned back for repairs.

W. D. Inness, 46, director of communications for National Airlines, died in Leesburg, Fla., Apr. 25.

Civil aircraft shipments during February totaled 227 planes, 761,000 lb. airframe weight, valued at $15.8 million. There were 283 engines shipped totaling 264,900 hp. At the end of the month there were unfilled orders for 686 civil planes of 3,000 lb. airframe weight and over.

Spartan School of Aeronautics has signed contract with American Airlines to provide Link training for approximately 25 AA crews, including all phases of instrument flight.

FINANCIAL

Lear, Inc., Grand Rapids, Mich., had 1951 earnings totaling $803,631 after federal taxes, on sales of $21,227,093. As of Dec. 31, Lear's backlog was approximately $40.7 million.

Fairchild Instrument & Camera Corp., Jamaica, N. Y., made $317,736 net profit during 1951 on sales of $16,543,359.

Boeing Airplane Co., Seattle, has received stockholder approval for increasing common shares from 1,250,000 to 2,500,000. A dividend will be distributed May 23 to holders of record May 9.

Beech Aircraft Corp., Wichita, voted a 20-cent regular quarterly dividend payable May 15 to stockholders of record on May 5. Net sales during first half of fiscal year were $39,920,091, with net income of $916,362. Backlog is more than $196 million.

Continental Air Lines reports net income of $37,074 for the first quarter ended Mar. 31.

California Eastern Airways reports a new high of $6,340,280 in operating revenues during 1951, with net income of $134,284.

Republic Aviation Corp., Farmingdale, N. Y., notes net income of $1,357,051 after provision for taxes for the first quarter of 1952.

Aeroquip Corp., Jackson, Mich., has declared a regular quarterly dividend of five cents payable June 2 to holders of record May 15.

U.S. Airlines had net earnings of $27,811 on operating revenues of $390,894 for the quarter ended Mar. 31, the first profitable quarter since the carrier began operation in 1946.

United Air Lines has declared its second 25-cent quarterly dividend, payable June 16 to common stockholders of record May 16. United has also declared first quarterly dividends on its new 4½% cumulative preferred to holders of record May 16. Dividend is 75 cents instead of the quarterly rate of $1.12½ because the stock has not been out three months.

INTERNATIONAL

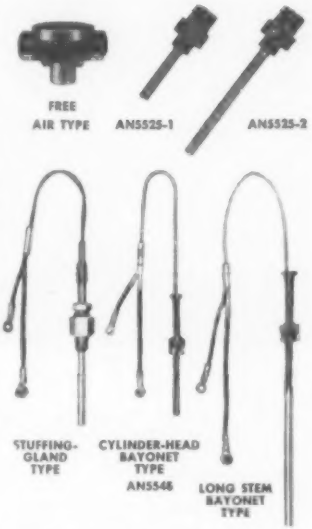
Clarence Sayen, president of the Air Line Pilots Assn., has been elected president of the International Federation of Air Line Pilots Assns., succeeding BOAC pilot B. C. Frost, named vice president.

Canadian government ordered $25.5 million in aircraft parts, supplies and overhaul work from Canadian firms in the period Feb. 16-Mar. 15. Largest single contract went to Bristol Aeroplane Engine Co. (Eastern) Ltd., Montreal, awarded $12,440,000 for engine repair and overhaul.

LEWIS
Resistance Bulbs

for Aircraft

FOR BEST RESULTS USE THESE ACCURATE, RESPONSIVE, STURDY TEMPERATURE-SENSING ELEMENTS WITH LEWIS RESISTANCE-TYPE THERMOMETERS.



Free-air bulb is designed for flush mounting with the wing surface.

AN5525-1 and AN5525-2 standard type with ⅝—18 threaded head, hermetically sealed. These bulbs exceed the response and operating temperature requirements of specification AN-B-19.

Stuffing-gland Type with ⅛ NPT threads, is suitable for measuring liquid temperatures.

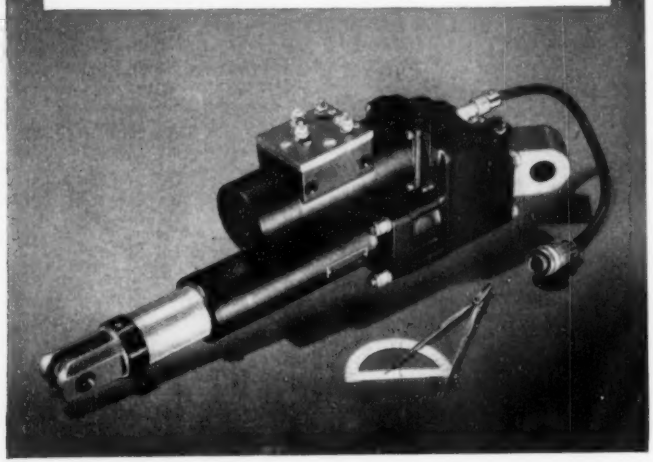
Cylinder-head Bayonet Type has probe dimensions similar to the familiar bayonet thermocouple and is used with same AN4076 fitting. Sensitive silver tipped element and sturdy spring insure fast, accurate temperature indication.

Long-stem Bayonet Type, used with AN4076 fitting, is similar in construction to the cylinder-head type except probe is 3⅜ inches longer, for special applications.

In addition to those illustrated, we manufacture bulbs for special applications to individual specifications.

THE LEWIS ENGINEERING CO.
Manufacturers of Complete Temperature Measuring Systems for Aircraft
NAUGATUCK, CONNECTICUT

Our largest *Lineator*® has 10,000 lb. working capacity



Although the R-502 LINEATOR—our largest electric linear actuator—weighs less than 22 pounds for a 6-inch stroke, it has a working capacity of 5 tons maximum and an ultimate static capacity of 10 tons.

Speeds—at 10,000 pounds load—are from 10 to 25 feet per minute, depending on the motor and gearing. The R-502 has nonjamming internal positive stops and adjustable limit switches which operate through external relays.

Dimensions and performance data—with maximum power motor—on R-502 and other Airborne Lineators are given in the I.A.S. Aeronautical Engineering Catalog.

AIRBORNE

ACCESSORIES CORPORATION

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AVIATION CALENDAR

May 5-7—Symposium, "Progress in Quality Electronic Components," sponsored by Institute of Radio Engineers, American Institute of Electrical Engineers, and Radio & Television Manufacturers Assn.; technical sessions at Dept. of Interior auditorium; registration at Roger Smith Hotel, Washington, D. C.

May 5-16—International Air Transport Assn. technical conference meeting, Copenhagen.

May 8-9—Fifth annual Wisconsin Aeronautics Conference, Hotel Northland, Green Bay.

May 11—International Air Transport Assn. traffic committee meeting, Buenos Aires.

May 12-14—National conference on airborne electronics, co-sponsored by Institute of Radio Engineers' Dayton section and Professional Group on Airborne Electronics, Dayton Biltmore Hotel, Dayton, Ohio.

May 14—National aircraft technical committee, Aircraft Industries Assn., meeting, Hotel Statler, Washington, D. C.

May 14-16—Society for Experimental Stress Analysis national meeting, Hotel Lincoln, Indianapolis.

May 15-16—American Helicopter Society annual forum and banquet, Hotel Washington, Washington, D. C.; May 17-18, air show Bolling Field.

May 15-16—Aircraft Industries Assn. Board of Governors meeting, Williamsburg, Va.

May 16—National Armed Forces Day dinner, Hotel Statler, Washington, D. C.

May 17-18—National Pilots Air Meet and Races, Chattanooga.

May 19—International Air Transport Assn. technical committee and medical committee meeting, Copenhagen.

May 20—Institute of the Aeronautical Sciences meeting, Cleveland-Akron section, Cleveland.

May 21—International Air Transport Assn. financial committee meeting, Rome, Italy.

May 22—American Rocket Society dinner, Hotel Astor, New York.

May 22-23—Aeronautical Training Society annual meeting, Carlton Hotel, Washington, D. C.

May 31—Philadelphia Aviation Country Club annual spring regatta, Wings Field, Ambler, Pa.

June 1-6—Society of Automotive Engineers summer meeting, Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.

June 3—Council for military aircraft standards, Aircraft Industries Assn., meeting, Hotel Statler, New York.

June 9-13—National Fire Protection Assn. annual meeting; aviation seminar on June 10, Hotel Statler, New York.

June 17-19—Aircraft Trade Shows international exhibit of aircraft parts and equipment, Hotel Park Sheraton, New York.

PICTURE CREDITS

9—(top) Gyrodyne Co.; (center, bottom left) Wide World; 13—AAF; 14—USAF; 15—Lockheed; 16—BOAC; 26—Boeing Airplane Co.; 29—Ryan Aeronautical Co.; 38—United Aircraft Corp.; 49, 50 (top)—McGraw-Hill World News; 56—Swissair.

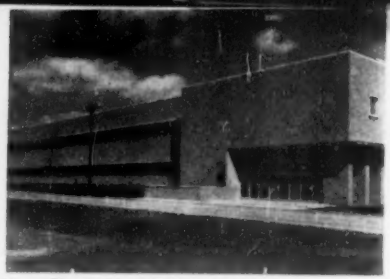
The Week's Plane News In Pictures

FIRST TIME UP—Gyrodyne 2c (above) rises on its initial flight test with pilot Jim Ryan at the controls. The big coaxial craft can seat 6-7 or pilot, attendant and three litters. (See Aviation Week Apr. 28, p. 25 for engineering analysis.)

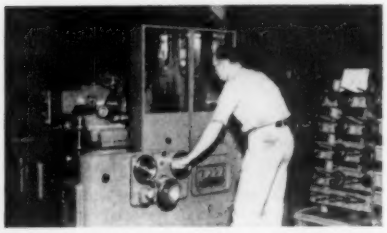
FIAT ALOFT—New Italian Fiat G 80 jet trainer pictured during a flight test is first of three versions each powered by different engines. This model has the DH Goblin, the second will have a DH Ghost, the third will be fitted with a Rolls-Royce Nene. G 80 seats two in tandem, has 500-mph. top speed, spans 36 ft. (See Aviation Week Mar. 17, p. 28 for engineering analysis.)

F-84S IN KOREA & AT HOME—Two different aspects of the Republic F-84 show two Thunderjets (below) being boosted off a Korean air base by Rato on their way to drop bombs on an enemy target; view at right displays plane's six-gun firepower during night trial at manufacturer's Farmingdale, L. I., N. Y., plant.

"Super-cells" in development area are capable of housing jets more powerful than any now in existence. Thirty-three new cells for production engines have also been added.



New office building is pivot-point of jet center. Functional construction and decor contribute to efficiency.



New machine grinds gears to tolerances of .0003 inches. Modern machinery like this speeds jet manufacture.

Test cell control room is "floated" on rubber cushions and suspended in air to insure instrument accuracy.

JET CENTER, U.S.A.

Nearly four million square feet of floor space, employment approaching 8000, and some of the most modern and complete jet-producing facilities in the world make up "Jet Center, U.S.A.," the new General Electric plant at Lockland, Ohio. Dedicated on the tenth anniversary of the first American jet engine, this new jet giant will be a tremendous factor in the future of American aviation.

Lockland provides for rapid expansion to meet national emergencies as well as a foundation for peace time production. While its recent rapid growth has been due mainly to the demands of increased aircraft production, Lockland will remain to spearhead the progress of aviation and to bulwark national security.

Features of the new plant are a new parts production building and a new engineering and administration building, both recently completed, and a new Components Development Center now under construction. One large building, previously used for assembly of production engines, is now devoted to development work to bridge the difficult gap between experiment and production. Two huge new test cells, with a common control room, have been built especially large to accommodate engines of extremely high thrust ratings.

During the fastest ten years in history, jet engines designed and developed by General Electric have powered more planes, set more records, and flown more hours than all other U.S. jets combined. Now, with this experience, a team of skilled workers and the new facilities available at Lockland, General Electric works for the future.

210-28

You can put your confidence in—

GENERAL ELECTRIC

WHO'S WHERE

In the Front Office

James (Jock) Simpson, general manager of Douglas Aircraft Co.'s Long Beach division since 1951, has been named a vice president of the firm. Simpson joined Douglas in 1923 following separation from the RAF. **M. A. Kavanaugh** has been designated controller. He has been with the Douglas organization since 1930.

Arthur P. Davis has returned from retirement to become president of Arma Corp., New York electronics firm, and **Donald B. Hess,** former president of the company and also head of the parent firm American Bosch Corp., has been elected vice chairman of Arma. Co-founder of Arma, Davis had been president of the company until 1947, when he retired. Hess remains president of American Bosch.

Changes

George Crothers has been appointed manager of the new Toronto, Canada, branch of General Controls Co., with headquarters in the Commonwealth Building.

Howard W. Merrill has been designated chief electro-mechanical engineer for Glenn L. Martin Co., Baltimore.

Capt. Maurice Luby is resigning in July as Director of Engine Research and Development (Air), British Ministry of Supply, to become director and general manager of Rotax Ltd., London. He is also being appointed a member of the board of Joseph Lucas (Gas Turbine Equipment) Ltd.

Jerome Kemondera will head the aviation section of new Detroit office of Greer Hydraulics, New York. **Wade P. Lamson** has been promoted to Greer's sales engineering staff.

Henry D. Vexan has been named industrial relations director for Kaman Aircraft Corp., Windsor Locks, Conn.

James B. Miller has been appointed European director for United Air Lines, with headquarters in London, replacing **Eugene George,** who is being rotated back to the U. S.

George Masters has been named director of publicity for Northwest Airlines, succeeding **J. A. Ferris,** resigned.

G. Robert Henry has been designated director of legal department and governmental affairs for Bonanza Air Lines.

Honors and Elections

Herbert O. Fisher has resigned as chief test pilot and sales representative with Curtiss-Wright Corp. to become executive director and secretary of the Corporation Aircraft Owners Assn.

Dr. Louis Ten Eyck Thompson, vice president of Norden Laboratories, Corp., White Plains, N. Y., has been awarded the Navy's Distinguished Civilian Service Award for scientific achievements in Naval ordnance.

Guy M. Springer, manager of cargo sales for Capital Airlines, has been elected chairman of the Cargo Advisory Board of the Air Traffic Conference of America.

INDUSTRY OBSERVER

► Canada will supply four Royal Canadian Air Force squadrons to the North Atlantic Treaty Organization by year-end 1952 and is committed to a total of 12 by end of 1954. Two squadrons already are stationed in England and others arriving during the next two years will base in Germany, France and England. Canadian officials report air crew training is now proceeding at a rate of 1,400 annually.

► **Jack & Heintz will soon begin operation of its plant No. 1 altitude test chamber. Test facility, built at a cost of $150,000, is reported accurate up to altitude equivalents of 100,000 ft. Company will use test chamber to prove out its rotomotive items.**

► Hydraulic Press, Inc., Mt. Gilead, O., is manufacturing a new press for North American Aviation. The press, reported in the 7,000-ton capacity class, will take almost one year to build.

► **University of Detroit has been conducting windtunnel shakedown tests of a new type helicopter for McDonnell Aircraft Corp. Reports are that the tests are the second of series conducted by the university. First series were conducted in behalf of jet aircraft and guided missile research projects.**

► Bristol type 175 airliners, of which 25 are on order for British Overseas Airways Corp., will be powered by four Bristol Proteus 3 gas turbine engines driving four-bladed 16 ft. dia. de Havilland hollow steel propellers. The new de Havilland prop has completed 15,000 hr. on test beds and in flight aboard an Ambassador transport.

► **Sales campaigns by Sperry and Eclipse-Pioneer to sell automatic approach couplers to the airlines may suffer a serious setback if the Doolittle Airport Commission recommends that landing minimums be raised, thereby negating the value of the couplers for low minimums.**

► Further examination of the Los Angeles S-55 Sikorsky helicopter damaged in a recent crackup has shown that the machine is in repairable condition; it is to be shipped back to the factory at Bridgeport, Conn.

► **The twin-jet CF-100 Canuck nightfighter built by Avro Canada, Ltd. may be the next plane to experience the novel Zurabatic cartwheel, since the inventor of the aerial maneuver has been assigned to join the Canadian firm as a test pilot. He is Jan Zurakowski, former Polish officer who shot down six German planes in the Battle of Britain while flying with the RAF. He has been test-flying with Gloster since 1947. The sideways cartwheel requires a twin-engine plane such as the Meteor, which he used for its first public performance at Farnborough last September.**

► Vickers is beating the drums to sell a highspeed military transport version of its sweptwing four-jet Valiant bomber, but RAF Transport Command orders have not yet been disclosed. Sales argument is that standardized engines and good portion of the airframes could be moved down the same line for both bombers and fighters.

► **Although USAF officials expect aircraft manufacturers to have great difficulty in meeting production schedules for the next six months, March deliveries of between 550 and 600 planes were a trifle ahead of schedule. (USAF counts a plane as "delivered" when it is fully equipped for operational use, which may be some time after it is "accepted" from the manufacturer.) March bomber deliveries were less than 50; a jet fighter much in demand in Korea is back on schedule after running behind most of last year.**

► After completing preliminary test flights from Larson AFB, Moses Lake, Wash., the eight-jet Boeing YB-52 heavy bomber has flown back to its home plant at Seattle and will operate from Boeing Field, "principally" for the next phase of tests, according to Boeing announcement.

► **A French process for building aircraft wings of pre-stressed concrete is expected to have a future in construction of supersonic planes where high wingloading is a requirement. An experimental wing developed by Breguet is reported to have greater strength than conventional wings of comparable size, besides being cheaper and easier to build.**

Washington Roundup

New Approach to Air Power

A new approach is being taken by Senate Preparedness Committee to substantiate its case for a speedy buildup of air power:

That U. S. air strength should be geared to balance enemy strength, not to balance the national budget—now the stock concern in Congress.

The committee, headed by Sen. Lyndon Johnson, is now gathering comprehensive data to knock down the congressional move to hold back money for air power and put off attainment of goals for a 143-wing Air Force and 16-carrier group Navy to 1956 or 1957. It plans to show that:

- The Soviet Union and satellites now have a decided edge quantitatively and, in many respects, qualitatively over Allied powers in air strength.
- A quick buildup of air power will cost the taxpayers less all-told than a drawn-out buildup by minimizing overhead.

This is the Committee's strategy:

- Hear active military air leaders in off-the-record sessions.
- Hear retired air leaders, who, unlike active officers, are not under obligation to support the Administration's air program in open session. Committee already has heard three urge a speedup: Gen. Carl Spaatz, USAF's first Chief of Staff; Lt. Gen. Ennis Whitehead, former commanding general of Air Defense Command, and Lt. Gen. K. B. Wolfe, former Deputy Chief of Staff for Materiel.
- Have staff members make field checks on production to determine the quality of engines, in particular, and whether output can be stepped up.
- Let USAF clean its own house. Hearings on alleged corruption in the letting of contracts at Wright-Patterson AFB are still officially on the committee's agenda. But these will give congressmen, arguing that the U. S. can get the same defense for less money through more efficiency, new ammunition.
- Participate, as ex officio members, in Senate Appropriations Committee's consideration of the coming 1953 fiscal year defense budget.

Carrier vs. Land Base

Argument over the carrier vs. the land base is becoming increasingly heated, as Congress ponders where to reduce funds for defense.

A newspaper column attacking carrier aviation as too costly and applauding land-based air, reportedly promoted by the Air Force, sparked it off recently.

The claim: that outfitting a Naval carrier force for combat costs over $3 billion, while outfitting an equivalent striking force of B-50's, including an air base defended by radar, F-86 Sabres and anti-aircraft artillery, costs only about $475 million, or one-seventh as much.

Publication set off these repercussions:

- USAF Chief of Staff Gen. Hoyt Vandenberg dispatched a telegram to all commanders cautioning against ill-considered statements.
- Secretary for Air Thomas Finletter simultaneously transferred USAF public relations staff from Vandenberg's office, placed it under his office, renamed it "Office of Public Information."
- Naval leaders challenged the piece.

Chief of Naval Operations Adm. William Fechteler reported: The cost of outfitting a carrier task group of four large carriers, four heavy cruisers and 32 destroyers at present prices is $2.4 billion, not $3 billion, as has been claimed.

Assistant Secretary of Navy for Air John Floberg commented: "There have been suggestions that the comparative cost of a fast carrier task force with land-based strategic bombers argues against increasing the Navy's carrier strength. . . . The record of the Navy . . . conclusively demonstrates an ability to achieve military miracles with a minimum of money. . . . I fail to see how we can logically . . . undertake a program of investing billions of dollars in overseas bases and overseas-based forces and then hesitate to invest a relatively small fraction of those billions in the instruments most essential to making those bases tenable and those forces supportable. . . . The program of ten 60,000-ton carriers has just one thing questionable about it—I doubt that we can afford to build those ships at as slow a rate as one a year. The cost of all ten of those vessels, substantial though it obviously will be, will not amount to much compared to a complex of land bases. . . ."

Carrier aviation has suffered the first blow: The House struck out funds for a second 60,000-ton flush-deck carrier to accommodate planes that will be available before the carrier could be completed in four years.

Economy was not the only motive for the House action: Navy gave the carrier No. 1 priority in its shipbuilding program, offered to accept a cut equal to its cost by eliminating lower priority ships scheduled in the program.

Fechteler's observation: "The elimination of the carrier could not, therefore, have been based upon considerations of economy. . . . To deny the Navy this type of ship is to deny the Navy the use in a very few years of the best plane which industry can build for carrier attack."

Vandenberg's Reappointment

Secretary Thomas Finletter smoothed the way for Senate confirmation of Gen. Hoyt Vandenberg's reappointment for 14 months as Chief of Staff.

Senate Armed Services Committeemen originally planned to hold up confirmation until the President retracted on the "reason" given for reappointment—"so that he might round out his full 30 years of military service as Chief of Staff." Committeemen thought it set an undesirable precedent that, once Chief of Staff, an officer would stay at the post until he reached retirement.

Finletter interceded with a statement to the committee making these points:

- At no time during discussions with the President was the reappointment justified on the grounds of Vandenberg's approaching retirement age;
- Generally, the President favors appointing Chiefs of Staff to other command posts after a four-year tour of duty.
- But, because of the great number of changes in the top USAF command during his short service as Secretary, he favored keeping Vandenberg on for continuity and until other prospects for the top post acquire broader experience.

Also confirmed by the Senate: Gen. Curtis LeMay to be Vice Chief of Staff and Gen. Nathan Twining to be commanding general, Strategic Air Command.

—Katherine Johnsen

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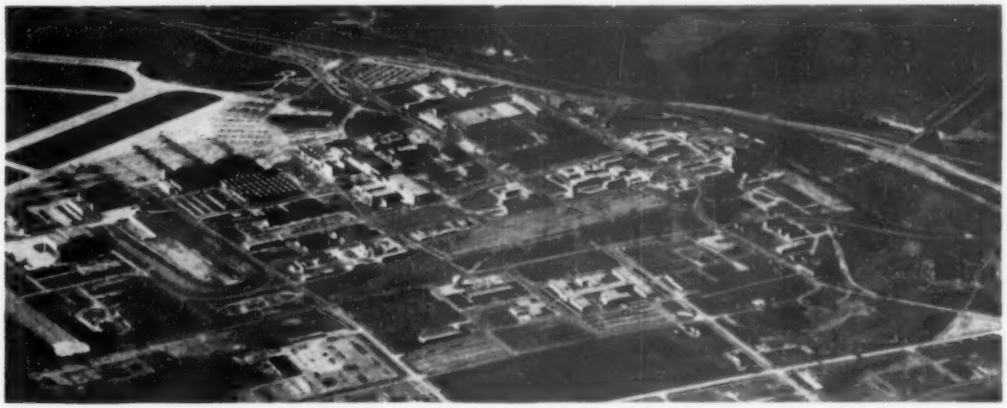


HEART OF USAF buying is the building group in top center of this photo of Wright Field—a small area of immense strategic importance.

New Light Shed on AMC Decentralization

- **Scattering buying and supply among 15 depots may not save much either in money or manpower.**
- **But there are other prime reasons: It will simplify logistics and ease administrative problems.**
- **And, above all, it will disperse a major target for potential enemy bombing or sabotage.**

Dayton, O.—The most fundamental change in Air Force procurement procedures in Air Materiel Command history is being worked out at Wright-Patterson Air Force Base here. The huge centralized buying and distribution structure is slowly and tenderly being disassembled for reasons only now coming to light.

Procurement of nearly everything but airframes, engines and propellers is being scattered from coast to coast and border to border (AVIATION WEEK Apr. 21, p. 12), spurred by three major considerations:

• **Strategic.** The Air Force has been getting increasingly uneasy over the fact that the heart and stomach of the Air Force body is concentrated in a relatively small area just outside this industrial city. From Wright-Patterson AFB is pumped the business for the aircraft industry that supports USAF. Through Wright-Patterson passes the materiel to feed USAF's many organisms. Knock out the base by sabotage or enemy attack and USAF would be dangerously crippled.

• **Logistics.** Most USAF supplies are stored elsewhere than at Wright-Patterson. But orders to replenish the stock do not emanate from these supply depots. The depots requisition materiel, AMC headquarters orders it. This requires voluminous documentation and, more detrimental, much time. Pipelines to users can, and do, get perilously low while the requisition moves through channels. By putting procurement right at the proper depot, AMC chiefs hope to cut this time lag.

• **Administrative.** The Wright-Patterson base can't get any bigger administratively without being mislaid in a mountain of paper bound in red tape. It now handles upwards of a million and a quarter pieces of mail and 46,000 teletype messages a month. Lt. Gen. E. M. Rawlings, AMC commander and creator of the decentralization, says that in all-out war Wright-Patterson would have to expand 25% above its present 36,000 employes. And, he says in effect, it's too big now to be administered efficiently.

In the face of those overriding considerations, the large and at times bitter opposition to decentralization is not expected to bring a reversal of the plan. The best the opponents can hope for, it seemed last week, is modification.

▶ **Has to Be Tried**—Gen. Rawlings, in an interview with three AVIATION WEEK editors, gave the impression of a man not pretending to know all the answers. Perhaps decentralization as now envisioned will work; perhaps it won't. But, Rawlings emphasized, something has to be tried. For years all concerned have admitted that Wright-Patterson's system is too big to be operated at maximum efficiency, yet nothing much was done to change it. Rawlings, at least, is going to try.

And he is backed up by his superiors in Washington. Highest Air Force officials last week said Rawlings was sent out to Dayton to reorganize AMC. He drew up his plan, submitted it to Washington and got approval which recently was re-affirmed.

When the decentralization was first announced to AMC employes and others, the major reason cited was economy. Only now are the three aspects listed above being termed the real reasons. To veteran observers in Dayton these three reasons make a better story for the plan. Money savings in the move are doubtful and intangible. As Gen. Rawlings says, "How do you measure dollar savings in speeding up our work?"

▶ **Probe Asked**—The Dayton Chamber of Commerce, which previously con-

doned the program on an economy basis, reportedly is asking government officials in Washington for a complete investigation of the benefits to be derived in transferring units from Wright-Patterson AFB. This action supposedly was taken after repeated protests from individuals and groups who believe decentralization will be costly to the defense effort in greater expense and less efficiency.

For one thing, these persons say, it takes six months to a year or longer to train a buyer; and many persons doing that type of work at AMC headquarters will not move. For another, in place of the one group of highly skilled administrators now running the Air Force's business from Dayton you will need 15 such groups, one for each depot that will be buying.

Gen. Rawlings has no fear on that score. He believes that depot commanders perhaps have not been used to their maximum skill and knowledge.

► **Disagreement**—And, above all other things, critics of decentralization talk about the role of the manufacturers' representatives. Top AMC chiefs officially do not recognize the need of a representative in doing business with AMC—although manufacturers will disagree, and the smaller the manufacturer the greater the disagreement.

A representative cited the case of one company that would have to do business with three depots, Rome, N. Y., Middletown, Pa., and Ogden, Utah. It's a small company. It could not afford the travel expenses of the representatives; neither could the rep. Most likely outcome would be that the company no longer would bid on USAF business. And, say experienced representatives, decentralization will force more than one small firm to abandon or greatly curtail Air Force work.

► **Highly Desirable**—The representatives, many of whom know AMC procurement problems and procedures even better than some of the buyers, agree that moving the supply and maintenance functions from Wright-Patterson is not only feasible but highly desirable. But they are very skeptical of the further plan to plump procurement down beside supply.

They say procurement could be speeded and eased right at AMC headquarters by less red tape. For instance, buyers no longer let contracts. After a buyer has decided who should get a contract, all the paper work goes to a committee representing the services section, and that committee takes final action. The manufacturers' representatives have been unsuccessful in obtaining an explanation for this seemingly unnecessary step.

The entire Wright-Patterson AFB complex is so massive, so inter-related that AMC chieftains must move gingerly in breaking it up. They cannot afford to make procurement and supply any slower than it now is. Nothing drastic will be done on procurement decentralization before the end of the present fiscal year June 30.

► **Timetable**—Meanwhile, decentralization of supply is being pushed on this timetable:

• **Robins AFB, Ga.** Lumber, June 2, shop machinery and parts, June 13, and fire control systems, bombing equipment, timekeeping, navigation, computing and optical instruments, propellers and parts for C-122 and B-57 aircraft, July 30.

• **Olmsted AFB, Pa.** Cargo parachutes, June 2, and railway, navigation, aircraft flight and engine instruments, automatic pilot and gyro control, miscellaneous and simulated aircraft instruments, transmission systems for rotary wing aircraft, Packard engine spare parts and spare parts for H-5, H-19, C-82, C-119, H-12, H-13, L-16, H-21 and F-47 aircraft, July 23.

• **Wilkins AFB, Ohio.** Clothing, June 2, and rubber materials, aircraft casings and inner tubes and publications, July 25.

• **Gadsden AFB, Ala.** Air conditioning, refrigeration and heating equipment, June 10, and packaging materials, July 9.

• **Kelly AFB, Tex.** Aircraft electrical equipment, aircraft ignition systems, aircraft carburetors, fuel injection pumps and spares for certain aircraft, June 20, and hazard detecting, decontaminating and impregnating equipment, airborne radio communications, airborne radar equipment, guided missiles, atomic special weapons and power operated turrets purchased locally, June 25.

• **Gentile AFB, Ohio.** Lamps and fuses, July 9, and capacitors, switches, circuit breakers, relays, contractors and solenoids, July 23.

• **Cheli AFB, Calif.** Musical instruments, athletic and recreation equipment, furniture, fixtures and other furnishings, and forage, plants, trees and seeds, July 18, and office equipment and supplies, July 25.

• **Griffiss AFB, N. Y.** Ground communications and electronics, June 6, and communication electrical equipment, July 23.

• **832nd AFB, Kan.** Paint, dope, special tools, metals, chemicals and hardware, June 9.

• **Mallory AFB, Tenn.** Bearings, hand tools, food service, laundry and dry cleaning equipment, June 10.

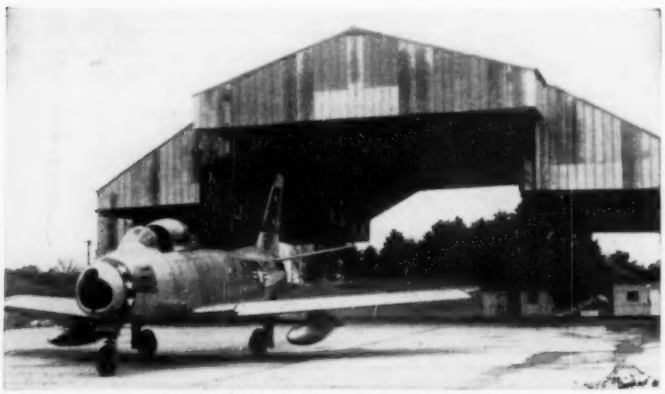
• **Tinker AFB, Okla.** Turbosuperchargers, miscellaneous aircraft accessories, aircraft fuel, hydraulic, vacuum, oil and de-icer systems, in-flight refueling equipment and parts for certain types of aircraft, June 20.

• **Hill AFB, Utah.** Individual and crew flying, navigation and landing trainers, bombing and gunnery training aids, miscellaneous training devices, wheels, brakes, skis, floats and related parts, hydraulic struts and actuating cylinders and parts for certain types of aircraft, June 27.

• **Brookley AFB, Ala.** Aerial photography, motion picture and marine equipment, July 9.

• **McClellan AFB, Calif.** Electric generators, auxiliary fuel tanks and parts for F-80, F-94, T-33, F-51, F-86 and standard aircraft, July 11.

• **Norton AFB, Calif.** Parts for T-29, C-47, C-54, C-117, C-118, C-124, C-121, C-125, B-25, B-45 and L-17 aircraft, July 16. —BCD/WK.



NEW HANGAR FOR FAST EXITS

New alert hangar at Burlington, Vt., station for Eastern Air Defense Force planes is located adjacent to runway having prevailing wind, has push-button operated doors to allow planes to "scramble" quickly. Front and rear doors of the hangar can be opened, permitting planes to taxi in and park without need for tractor assistance, allow engine runups under cover. The hangars are expected to be installed on other EADF bases.

AF Fund Cuts

- **Lovett says House slash would be a 'knockout.'**
- **Two retired air generals cite stretchout danger.**

Warnings that the proposed congressional cuts in Air Force appropriations would cause a further serious slowdown in rebuilding U.S. air power came from high defense officials last week and were re-echoed in testimony before the Senate Preparedness Committee.

In a spirited championing of air power against the congressional cuts, Air Force Secretary Thomas K. Finletter warned that cutbacks proposed by the House would mean a further stretchout of the 143-wing Air Force until 1957, from the originally planned date of 1954.

Finletter spoke out repeatedly against the proposal—at a Pentagon press conference, in a national broadcast for the American Legion and in an off-the-cuff telecast.

▶**Lovett Warning**—Defense Secretary Robert A. Lovett told another news conference that the House-imposed cuts are dangerous, and will operate as a "knockout" rather than a "stretchout." Senate hearings on the military appropriations are now going on, but timing of definite Senate action still appears uncertain.

Under fire by defense officials is the House-imposed $46-billion limit on U.S. Treasury expenditures in 1953, $6 billion less than was planned. This limit on spending is separate from the $4.7 billion previously cut from 1953 appropriations by the House.

▶**Wholesale Canceling**—Lovett said this would mean wholesale cancellation of defense orders, and its principal effect would be on weapons procurement.

A prediction that "in a few years" long-range missiles and fighters will replace the bomber for strategic air attack was made to the Senate Preparedness Committee by Lt. Gen. Ennis Whitehead, (Ret.), former commanding general, Air Defense Command.

▶**Five-to-Ten**—"There will be less loss than with bombers," he commented. "Today the bomber has to do the job, but I would say in five to ten years—and many think I am too conservative—smaller but higher-speed planes, manned or unmanned, will carry the major portion of atomic offensive."

In a statement endorsed later by Lt. Gen. K. B. Wolfe, (Ret.), former Deputy Chief of Air Staff for Materiel, Whitehead urged that four aspects of defense be given top and equal priority and rapidly built up to strengths capable of filling their missions: strategic air for offensive attack; air defense; naval strength capable of controlling the seas; ground forces sufficient to defend overseas bases and control disaster areas in the U.S. in the event of attack.

▶**Air Requirements**—Commenting that he was not qualified to judge Naval and Ground Force requirements, Whitehead placed air strategic and defense requirements at between 74 and 86 wings, as follows:

- **Strategic air.** Between 44 and 56 wings, including 6 to 10 heavy bomber wings, 25 to 30 medium bomber wings, 8 medium and heavy reconnaissance wings, and 5 to 8 fighter wings.
- **Air defense.** Thirty wings composed of 2,200 all-weather fighters, with 1,500 based in the U.S. and 500 to 700 for outer defense, based in Alaska, Greenland, Canada.

On July 31, 1951, the date of his retirement, Whitehead reported, the U.S. had "less than 100 all-weather fighters."

At that juncture, he estimated, the U.S.'s air defense force would have been capable of knocking out about 25% of an attacking force "at a few locations in daytime" with day fighters. Overall, he said, his command would have been able to knock out only from 10%-15% in daytime, and only 1% to 5% of a night attack force.

▶**Attack Would Succeed**—Asked what success he thought an air attack on the U.S. now might have, Whitehead replied:

"A well-planned, well-executed attack would succeed beyond the fondest hopes of its commander. It would have to be a one-way mission. Cold-blooded."

After protest by Sen. John Stennis to "scare" statements, Whitehead qualified that his observation referred to the situation at the time of his retirement a year ago. Johnson said, "This committee doesn't want to be the mouthpiece for issuing an invitation for attack."

Both Whitehead and Wolfe vigorously protested the "feast-and-famine" policy toward air power since the end of World War II.

At the time of the 1949 cutback in air strength to 48 groups, Whitehead said he placed "minimum" strength at 80 groups and both former Secretary for Air Stuart Symington and subsequently Secretary Thomas Finletter shared his view. At that time, when there was not yet the prospect of air bases ringing the globe, he said he recommended that strategic air be given first priority.

The 80-group force: 37 strategic air groups, including 26 heavy bomber groups; 20 air defense groups; five tactical air groups; 14 groups based in the Far East; two groups based in Europe; and two groups based in Alaska.

▶**Wolfe on Production**—Wolfe emphasized that aircraft production schedules worked out with manufacturers in March and April of last year "were realistic under the assumed conditions" that manpower, materials and machine tools would be available. He said the Munitions Board, which coordinates military requirements with civilian agencies, had told him they would be.

He said that "absolutely" aircraft production can and should be increased over its present rate.

LOCKHEED TRANSPORT FAMILY PORTRAIT

Development of transport planes by Lockheed Aircraft Corp. over an 18-year period is graphically depicted in this view showing six well-known models of the Burbank firm. From rear to foreground and left to right: Constitution, Electra, Model 12, Lodestar, Constellation and Super Constellation. Gross weights range from 8,650 lb. for the Electra to 184,000 lb. which has been quoted for the Constitution.

Sapphire Tested At 8,300 lb. Thrust

By Nat McKitterick
(McGraw-Hill World News)

London—The Armstrong Siddeley Sapphire jet AS. Sa 6 has been type tested to 8,300 lb. static thrust, which the company claims makes it the most powerful type-tested jet in the world.

The engine was tested continuously for 150 hr. under Ministry of Supply supervision and then stripped down for official scrutiny.

There are now officially four stages of Sapphire development in U.K.—AS. Sa 1, 2, 5, 6. AS. Sa 2 was type-tested to 7,380 lb. The Sapphire's nearest rival in Britain that has been made public so far is the Rolls-Royce Avon RA 1, officially rated at 6,500 lb. But already the existence of an RA 14 has been made public and it is safe to say that considerably higher thrusts for the Avon are in the making.

▶**To Get Engines**—In the U.K. the Sapphire is slated for one of two production models of the Hawker Hunter (P. 1067), the Gloster GA-5 twin-jet delta, all-weather fighter still not ordered by the RAF, and probably the forthcoming Handley Page crescent-wing bomber. This list is a measure of the production progress of the Sapphire in U.K.; none of these aircraft is within two years of service.

In the U. S., Curtiss-Wright and the Buick division of General Motors are building the Sapphire for the Martin B-57 and the new Republic F-84F fighter-bomber. There is talk in London of a deal which would see Republic F-84 airframes shipped to the U.K. for fitting with A/S Sapphires. RAF has no fighter-bomber of consequence in sight. The deal is just talk so far, though Republic has handed over to Armstrong Siddeley all the test data on the F-84F trials recently run at Edwards AFB.

▶**Small Quantity**—A/S is building the Sapphire in very small quantity at its Coventry works. But this plant is heavily committed to supplying Mambas for the Fairey Gannett naval antisubmarine fighter, which is on the selected list of "superpriority" aircraft recently announced. Quantity production of the Sapphire, therefore, will come from a new A/S subsidiary, Brockworth Engineering Co., Hucclecote, Glos.

The Sapphire is an axial-flow jet. An important feature is its single annular combustion chamber containing burners, instead of a number of different combustion chambers. The engine, in its original form, was air-tested in a Gloster Meteor. A twin Sapphire Meteor last August set the present international rate-of-climb record when it climbed to 40,000 ft. in 3 min. 95 sec.

FROM 40,000 FT. a Rome-bound Comet passenger sees the Alps under a swept back wing.

Flying in the Comet—

High, Quiet, Easy on the Nerves

By Wing Cmdr. Maurice Smith, DFC

One day very soon people in the United States are going to ask why the British have been allowed to get away with the first jet airliner and put it into service before an American design has even left the drawing boards. Frankly, their surprise at this somewhat unusual turn of events could not be much greater than that felt by many people in England, and no amount of talk about subsidies and un-economics can explain the facts away.

Hundreds of people in and about the industry have asked the de Havilland company and BOAC to give them a ride in the Comet, but testing, development and training commitments have caused most of them to be disappointed. I am one of the comparatively few to be lucky, having recently made a second flight—with BOAC to Rome.

From May 2 anyone can buy the normal-fare airline ticket and ride in the Comet on the London to South Africa route. Later there may be a Comet jet service for New York, Washington and the West Indies.

▶**What It's Like**—What is travel in the Comet going to be like? To start at the beginning, taxiing in the Comet

(Editor's note: Last week British Overseas Airways Corp. was scheduled to begin the world's first scheduled jet transport service from London to Johannesburg, South Africa with de Havilland Comets. Jet passengers find themselves in an entirely new world of nearly vibrationless flight, higher than commercial passengers ever have flown before. Non-jet airlines find themselves competing with a faster airplane with great passenger-appeal. To describe both these facets, AVIATION WEEK ordered the accompanying story from an experienced passenger on the first all-British pre-service demonstration flight. Wing Cmdr. Smith is editor of the well-known British magazine Flight.)

does not feel very different from taxiing in any other aircraft. But the note of the engines is distinctive, and once they have been started very little time can be spent on pre-takeoff checks. I have been told that the weight of kerosene burned in 15 min. taxiing is worth one passenger.

At the start of takeoff run the acceleration is quite slow, even though the roar of the Ghost turbojets is urgent and powerful. Shortly before the Comet unsticks, the speed seems to be building up more quickly, and once airborne there is a big reserve of climb power.

In fact, the first and one of the best new impressions to be gained from jet flight is that experienced for a matter of seconds after leaving the runway, when the high rate of climb and quick speed buildup, together with smoothness, can all be appreciated. Comet performance at takeoff and on the initial climb makes a nonsense of more than one of the existing airworthiness certification requirements.

► **Can Hold Pattern**—On occasions, Comets will have to level off low down until they have cleared the traffic pattern around major airports. Such is the contrast between the fast initial climb and the slow level procedure flight required in these circumstances that it feels more like a power cut and glide.

If the Comet must hold in the vicinity of an airfield, it can do so comfortably at the same speeds as do the previous generation of airliners; but the higher and earlier it receives the delay warning the better. On the service into London, Comets will carry normal reserves and diversion fuel for Prestwick.

And what of the noise? The Comet is not particularly quiet in the silence sense. Rather, it is quiet on the nerves. Even so, there is less actual noise than on almost any other four-engine design. What noise there is may be described as of the steady type, lacking the irritating thump and pulse of airscrews and piston-engine exhaust. Coupled with absence of vibration and shorter periods spent in the air, this will certainly make for more comfortable travel and a less jaded arrival for long-distance passengers.

► **Better View**—Even the absence of moving power-unit components outside the windows plays a part towards restfulness. The only exterior items which might be seen moving—and slower than snails—are the jet pipes, which, due to the heat, expand by an inch or so at high power and retract again into their shrouds when power is cut back, as on the descent from altitude. The absence of engine nacelles and propellers allows passengers a much better view over the wings.

For anyone who is particularly noise-conscious, it is possible to take one's pick of the kind of sound to surround one's seat in the Comet.

There are areas, or "packs," of sound in the fuselage with a surprisingly abrupt change from one to the next. In the small forward cabin, close to the turbojet intakes, there is no more than a subdued rushing and whistling to be heard. In the front of the main cabin the high whine of the Ghosts is at its modest loudest. Midway in the main cabin there is a just-audible whine and a gentle jet drone, while further back again there is no whine at all but an increasing roar and rumble of jet exhaust.

Through the doors into the entrance lobby the noise increases more, and in the two toilet compartments in the tail there is little to distinguish the Comet from any other aircraft, except perhaps the fact that the movement is a drumming and pulse in the air rather than a vibration felt through the structure of the aircraft.

► **From the Cockpit**—There is a remarkable and remote steadiness, perhaps better described as rigidity, to be felt when flying in the Comet over 7 mi. high and at nearly 500 mph. If one is fortunate enough to visit the cockpit, separated from the cabin by the galley, he can appreciate even better being carried into the realms of the test and combat pilots in the serene calm and intense cold of the stratosphere.

The view ahead is often almost unlimited, and situated well forward of the jets (as one is in the crew compartment) there is practically no sound at all. The instruments may show figures incredible for an airline—Mach 0.75, outside temperature —40C, engine speed 9,500 rpm.

Weather lies forgotten under powder-puff clouds far below. Only a very occasional tropical cloud top or wisps of ice crystals reach up to the Comet. In a clear sky of intense brilliance and blueness one gets an "infrared" view of the horizon, which may be 200 mi. away, and except for the sea, color is almost lost, light and dark shades providing the contrasts.

Any landmark within 50 mi. on either side appears to be almost directly beneath the aircraft. In one sense Comet passengers may feel disappointed, for there is no sense of speed or even of movement in level cruising flight. Realization of the speed of travel will perhaps come later and leave its impressions in retrospect.

► **The Let-Down**—Time for the long let-down comes up almost before a meal can be served and eaten. The turbine power is cut back and the sound drops to a purr. There is little impression of descent, even with the dive brakes extended; the cloud comes nearer, and as the layers are pierced an occasional sharp bump may be felt.

Because of their thirst, two of the four jets are usually kept "throttled" back, when descending or holding, and with as little delay as possible the Comet is eased back onto the ground. She lands light, for four turbines weigh much less than four large piston engines and their propellers, and a big fuel load will have been consumed. The large flaps and generous area of the moderately sweptback wings allow a safe touch-down speed as low as for a ship having no more than half the Comet's top speed.

'Sitdown' Airmen May Be Dismissed

Pentagon observers last week predicted the 14 Air Force reservists who refused to fly will ultimately be ordered dismissed from the service, without prejudice, by USAF headquarters.

Two of the 14 already have been tried by military courts at their bases and sentenced to dishonorable discharge, pending appeal to USAF headquarters. But it was expected all would be treated alike and the sentences rescinded.

USAF Chief of Staff Hoyt S. Vandenberg told a Pentagon press conference that fear of combat rather than fear of flying was involved in most of the cases. He said there is nothing new in an aircrewman's desire to be somewhere else when the finger of combat points at him.

Vandenberg added that he felt the group involved in the so-called "sitdown" had cast a shadow on the records of thousands of other Air Force officers and men, and "should not be allowed to quit without some onus."

► **Finletter's View**—Air Force Secretary Thomas K. Finletter stated that a flying rating is entirely voluntary and must

remain so. So long as the rated officer is physically and professionally qualified and so long as his rated services are needed, voluntary suspension from flying status will be approved only "under the most unusual circumstances."

An individual who states in writing or exhibits his fear of flying will be examined by medical officers. If found disqualified due to psycho-neurosis, he will be grounded and given proper medical treatment.

If an individual is declared qualified and yet seeks to avoid hazardous duty, in particular training for and actual combat, he has failed to live up to Air Force officer standards and should be separated from the service, Finletter declared.

► **Reserve Problem**—Two categories are included among the 14 reservists:

• **Voluntary reservists,** who have indicated willingness to fly for the Air Force since the end of World War II when they were relieved from active duty. This group has been receiving remuneration from the Air Force for "week-end reserve flight training." They knew they could be called to active duty for combat at any time.

• **Involuntary reserves,** officers during World War II, who were dismissed following that duty and have taken no part in active reserve training activities.

Both Army and Navy are watching USAF reserve problems. They, too, face similar situations. All three services are probing reserve programs and personnel to tighten recalls to active duty and to get a more selective recall system. Simultaneously, all are reviewing and revising combat rotation systems to make combat duty in Korea more palatable. Plans are not completely crystalized but undoubtedly will result in less combat theater time.

Closing Hurt Newark, PNYA Head Says

Closing of Newark Airport to commercial traffic since Feb. 11 following three crashes into nearby Elizabeth, N. J., has resulted in definite financial hardships for local business firms and has pointed up the dependence of the industrial community and citizenry on close-in air terminal facilities, Port of New York Authority Chairman Howard S. Cullman claims.

Speaking before the Queens, N. Y., Chamber of Commerce recently, Cullman discussed these economic aspects and the relationship of the air-sea-land transportation setup to jobs in the port community. "If that machine were critically disturbed," he warned, "most of us would have to pack our belongings and look for work someplace else."

According to a survey conducted among New Jersey businessmen, Cullman revealed, 54% considered air passenger service as either vital or important to their business and 75% reported they had reduced their air travel because of the Newark Airport closing. One company said closing the field has resulted in its temporarily dropping plans to put up another factory in New Jersey.

Cullman also mentioned the airports' role in providing local employment—the three fields under PNYA jurisdiction—Newark, LaGuardia and Idlewild—now employ 15,500 and have an annual payroll of $70 million. He expects that by 1965 the fields will employ 42,000 and pay out $190 million in salaries annually. In addition, by 1965 the three airports will account for a $300 million annual gross product, including salaries, purchases and services, but not counting ticket sales.

The PNYA chairman also discussed the National Air Transport Coordinating Committee's role, under the leadership of Eastern Air Lines' President Rickenbacker, in working out a program of ensuring minimum operations over densely populated areas. Flight schedules were adjusted by the airlines cooperatively so that the LaGuardia Field load actually was decreased following the closing of Newark airport, he declared.

Slick Asks Mail

Slick Airways last week applied to Civil Aeronautics Board for permission to carry air mail and air express not only at a "non-subsidy" rate, but at a rate much lower than the 45 cents a ton-mile set by CAB for American, United, Eastern and TWA.

Slick says it always has been willing to carry mail without a subsidy, but that at the time its all-cargo certificate was granted in 1949 mail rates contained subsidy payments needed by the passenger airlines. That no longer is true, Slick said. Slick carries cargo for about 15 cents a ton-mile and "would obviously be willing to carry all mail . . . at 45 cents a ton-mile."

But creation of an "all-cargo mail rate classification" is in order, the carrier told the Board. This would also apply to air parcel post. Presumably, it would be well below the 45 cents a ton-mile paid the "Big Four," a rate CAB considers compensatory. Slick says that rate was set to cover costs of operating combination planes, not all-cargo craft.

Slick also maintains it could carry express cheaper than the present rate of about 60 cents a ton-mile inasmuch as average air freight rates, including pickup and delivery "certainly do not exceed 18 to 20 cents a ton-mile."

Navy Accepts British Carrier Catapult

Navy has accepted a British-developed steam-operated highspeed catapult which will enable U.S. carriers to hurl planes into the air downwind or alongside a dock.

Nicknamed the "steam slingshot," the new catapult (AVIATION WEEK Mar. 24, p. 32) was tested for Navy by the British carrier HMS Perseus at the Naval Shipyard, Philadelphia, at Norfolk and at sea early this year. The Perseus has now returned to its base in Britain.

Navy officials said that the first U.S. steam catapult would be installed aboard the USS Hancock (Essex class), which now is undergoing modernization to be completed in 1954, including strengthening decks, larger elevators and heavier arresting and catapulting gear.

First units will be purchased from the British until U.S. manufacturers can begin to produce them. The steam catapult is also being considered for use aboard the 57,000 ton super-carrier "Forrestal," Navy said.

Cause of Near-Crash Revealed to Pilots

Cause of the recent near-crash of a United Air Lines DC-3 taking off from Mills Field, Calif., was improper loading of passengers and cargo too far aft in the plane, CAB Investigator Earl Mitchell has reported to a West Coast pilots' meeting.

The plane veered 90 deg. to the right after taking off. It circled the field one and one-half times before the pilot and copilot could straighten it out. They landed three minutes later, having gained no more than 300 ft. of altitude.

Cargo was 59 lb. overweight for the rear cargo pit, Mitchell said, and all 21 passengers sat aft in the 28-passenger DC-3. This caused loading at 30% from center of gravity. Company limit is 26% and maximum allowable for the aircraft is 28%.

Tail-heaviness caused the fuselage to blank out the air flow over the tail's control surfaces, the CAB investigator told the pilots.

Get in the Scrap—Turn Yours in for Defense

Aro Tells Its Story to Congress

Sverdrup and Parcel says project comprised 40% of firm's 1951 work, accounted for 15% of its profits.

Congressional blasts at operation of the new USAF Arnold Engineering Development Center at Tullahoma, Tenn., have evoked a strong counter-statement from the operator, Aro, Inc., a subsidiary of the St. Louis engineering firm of Sverdrup and Parcel.

Circumstances of the agreement between the firm and USAF for management of the facility and its supersonic testing equipment were related in a report to the House Appropriations Committee.

Supporting the Sverdrup and Parcel presentation is the official position of the Air Force that final judgment of the operation of the facility at this early stage "would be both premature and unfair."

Air Force position stated by James T. Hill, USAF general counsel, in a letter to Congress has full concurrence of top department of Air Force officials, AVIATION WEEK has learned. The letter asks that the contractor be given a fair opportunity to be heard. It also stresses the value of the facilities to be opened at the center and difficulty in getting competent technical personnel to operate them.

▶**Air Force Position**—Behind the original decision to put the center under private industry operation, Air Force officials say, are these basic research contracting factors:

- Private industry can operate a major research facility at less expense than the government.
- Lack of permanency of military assignments in specialized fields hampers continuous control and operation of long range programs.
- Difficulties inherent in U. S. Civil Service systems regarding pay, length of service, personnel incompetence and employment terminations are sometimes insurmountable.
- Delays in work projects and programs in government-operated facilities due to administrative red tape prove costly both in dollars and national security.

▶**Gore's Attack**—In an attack upon conditions of the Aro contract, Rep. Albert Gore said on the floor of the House that Sverdrup and Parcel, holding a contract for preliminary work and planning of USAF's $150 million Arnold Engineering Development Center, had spent approximately $10.5 million for "preliminary paper work before it ever moved a shovel of dirt."

In rebuttal, Sverdrup and Parcel point to documents submitted to the House Committee showing that John I. Parcel of the engineering firm was asked by Air Force to meet its representatives at Wright-Patterson AFB in May, 1946. The company and other firms submitted written sealed proposals to provide design and engineering services for the new proposed center.

L. J. Sverdrup said Air Force told him the contract went to his company because its proposal "constituted the lowest and best submitted."

In this connection, the company declared, AEDC contracts in 1951 constituted approximately 40% of the firm's work, while they resulted in only 15% of its total profits.

▶**Reply to Gore**—Replying to Gore's attack, company reports submitted to the committee show that instead of the alleged $10.5 million spending charged by Gore, "as of May 31, 1950, the government had spent under (Sverdrup and Parcel) contracts for engineering services (including fee) approximately $3.2 million—and not 'almost $10.5 million'—and this included some final design, plans and specifications for use in actual construction."

Answering Gore's reference to movement of "a shovel full of dirt," the company pointed out that "letting of construction contracts and supervision of their performance are functions of the Corps of Engineers and not Sverdrup and Parcel or the Air Force." Actual construction was begun June 1, 1950, the day after culmination of the $3.2 million expenditure, Sverdrup and Parcel stated.

After selection of the Tullahoma site Congress voted authorization for AEDC construction and Sverdrup and Parcel was awarded a second contract, AF33 (038)-9928, in Dec., 1949. This contract included a cost estimate of $6,923,431.53 and a fixed fee of $484,640.21. It provided for master planning, construction drawings, specifications engineering planning. According to the company, this contract is now 40% complete.

▶**Organization of Aro**—In April, 1950, Aro was incorporated. Stock was held equally by Sverdrup and Parcel, Inc. and Aerojet Engineering Corp. The name Aro was a contraction of Arnold Research Organization.

Shortly after, Air Force notified Sverdrup and Parcel that because Aerojet manufactured or might manufacture products which would be tested at AEDC, neither Aerojet nor any other aircraft manufacturer could be allowed to participate in the center's operation

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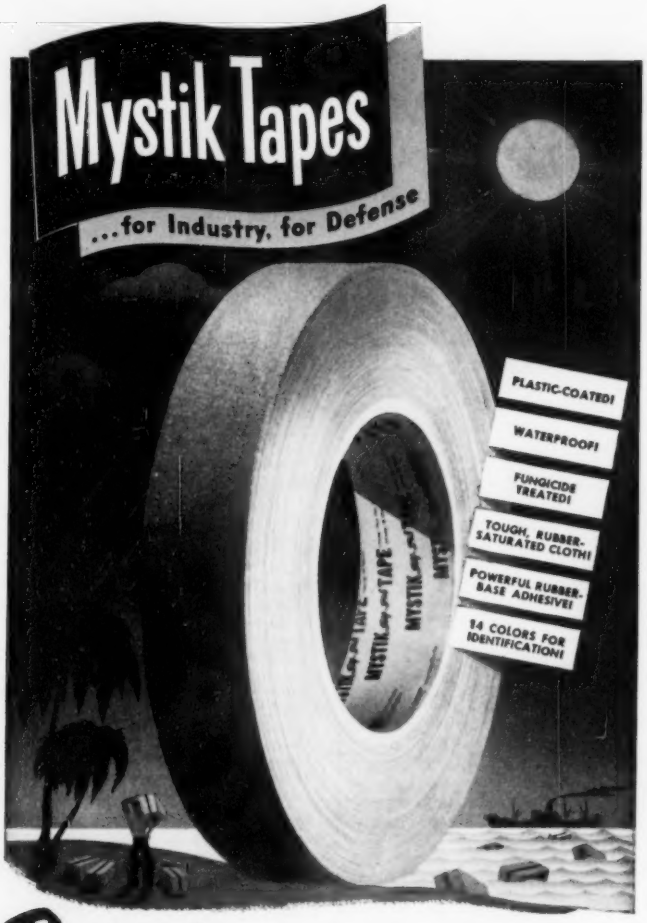

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because proprietary secrecy of items tested had to be protected from competitive manufacturers.

As a result, Sverdrup and Parcel purchased stock held by Aerojet and distributed it among L. J. Sverdrup, E. R. Grant, B. R. Smith, D. C. Wolfe, W. E. Moser, Stephen J. Bechtel, W. M. McAfee and David R. Calhoun.

Aro's first contract (the third on AEDC held by Sverdrup and Parcel) covered 18 months, ending Sept. 30, 1951. Set on a cost-plus-fixed-fee basis, the contract was estimated at $694,174.50. The company estimate was $890,568.00. At contract termination the actual cost was set at $797,888.91. The fee was $23,474.50—approximately 3½% of contract estimate.

► **Refute Statement**—Current contract under which Aro is operating AEDC runs to Sept. 30, 1952.

Reports submitted to the House Committee by Sverdrup and Parcel were aimed at refuting a published statement that Aro budget estimates leaped from $1.5 million to $12.9 million plus a fee of $451,000.

"Our estimate," the firm told the Committee, "included not only funds that would flow through the Aro contract, but also funds that AEDC would have to spend for capital items, such as machinery, etc., and which could not be purchased by or through Aro. That estimate amounted to $12,966,402, of which only the sum of $3,433,402 was estimated to cover Aro requirements.

"A joint estimate was concurred in by the working levels of AEDC and Aro and resulted in a figure of $2,318,458. However, this excluded the cost of a training program and other items; the inclusion of such items would result in a figure of $3,110,062. However, we were informed by AEDC that an estimate in excess of $1,508,000 could not be agreed to because it had no funds available in excess of that amount. Allocation of additional funds in excess of that amount would require action by a higher authority."

At a meeting Sept. 13, 1951, attended by Lt. Gen. Earle E. Partridge, Research and Development commander, and his staff the situation was made known. At that time Partridge, as higher authority, agreed to a new cost estimate of $3 million and following that a fee was set at $95,000.

(Editor's Note: Nearly 10 months ago, AVIATION WEEK pointed out (July 2, 1951, p. 13) the optimism of the official first-run dates for the Tullahoma facility. Engineering Editor Dave Anderton, after an inspection tour of the AEDC, concluded: "Considering the visible evidence of the state of the German equipment, and the progress of construction, original AF estimates of 1955 as the completion date for the facility seem out of line by about two years.")

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R. R. "ROCKY" HALL, Denver, Colo., President of Western Auto Transports, Inc., moves 2500 new cars a month from Detroit to Pacific states dealers; says he uses his Cessna 190 to visit company terminals from Detroit to Los Angeles, call on dealers and manufacturers, vacation in Mexico. Rocky likes his 190's range, often flies from Denver to Joliet, Ill., nonstop. Weather is no problem. Hall says his Cessna is "the best plane I've ever owned"—and he's owned 7, including one multi-engine ship.

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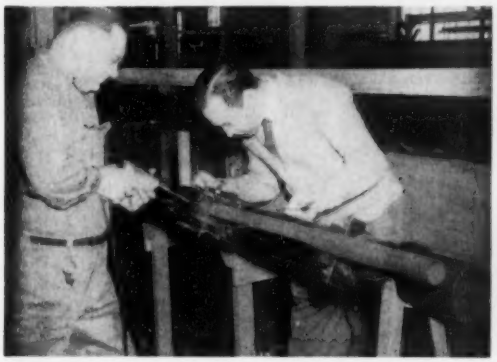
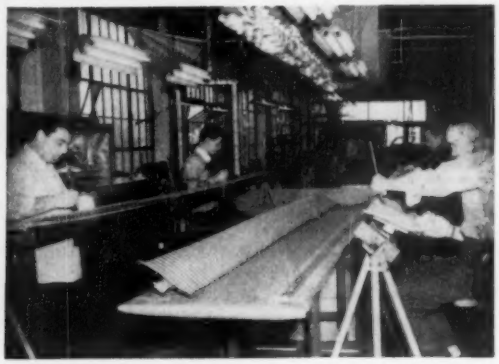
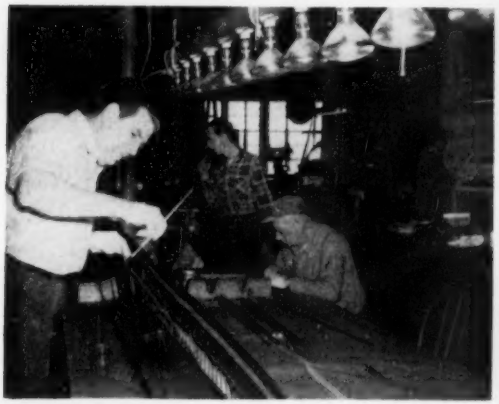


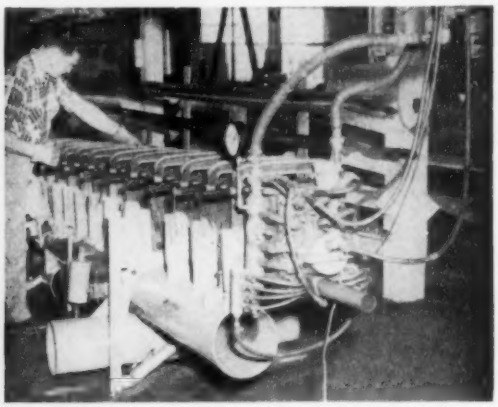
DRILLING of spars is one of the preparatory steps in Prewitt blade production.



COATING of adhesive is applied by hand and paintbrush to the stamped stiffener.



FINISHING coat of adhesive is applied to trailing edge after tacking.



BONDING takes place in this steam-heated mold where tacked assembly is clamped together.

New Techniques Build Prewitt's Rotors

Hollow, all-metal copter blade was designed with eye to fabrication ease; in production for HUP-2.

By David A. Anderton

A new kind of helicopter rotor blade is in production at the Prewitt Aircraft Co., Clifton Heights, Pa., slated for the Piasecki HUP-2 twin-rotor copter.

• **It is all-metal**—steel spar, stainless steel skin, aluminum-alloy stiffeners—and the parts are bonded together with adhesive.

• **It has been designed** with high production methods in mind, and the tools are simple and adaptable.

• **It has high aerodynamic** efficiency and smooth, close-tolerance contours.

• **It is completely hollow**, which makes it a natural for thermal propulsion or anti-icing.

▶ **Garage Start**—Development of the new blade was started by Richard S. Prewitt in his garage six years ago. Prewitt canvassed manufacturers and the services for individual conceptions of blade characteristics—what made a blade "good"—and put the results into a trial design. That design was selected by the Navy in a 1947 competition among blade designers, and Prewitt got the go-ahead for development.

To complete his design, he had to pioneer most of its features. Foremost among the problems was the adhesive process for metal-to-metal bonding. Lightweight stiffeners had to be evolved. Blades had not been covered with stainless steel before. A steel spar had to be drawn from circular tubing to a D-section, and to have increased thickness—which equals strength—at the root.

Besides, there had to be a mold to guarantee the contours and reproducibility of the blade.

▶ **Tests Completed**—The first set of blades completed whirl tests at Wright-Patterson AFB by mid-1949, and ex-

ceeded specifications in every respect. By March, 1951, the first blades with optimum twist were delivered to Piasecki Helicopter Corp. for flight tests. By September, a set had been installed on a tied-down copter test rig for a 250-hr. endurance run.

Prewitt received a letter of intent for the production of blades for Piasecki even before tie-down tests began.

The factory meantime had grown from garage and cellar to 3,500 sq. ft. of floor space in 1949. About mid-1951, an additional 15,000 sq. ft. of space was leased for offices and production. Most recently, Prewitt negotiated successfully for the entire 50,000 sq. ft. of factory space at the present site.

▶ **Expandable Mold**—Key tool in the Prewitt process is the heated mold—invented by Martin Larson, head of the experimental shop—which holds and bonds the blade components into an accurate assembly. The mold is built of sections banged out by a punch press, laminated together like the slices in a loaf of bread, and through-bolted with tension rods. Steam is circulated through passages in the mold for heating the components to the curing temperature of the adhesive.

There are several interesting features of this mold design.

- First, it is cheap and simple to manufacture, because it requires only two-dimensional working instead of three-dimensional die-sinking.
- Second, once the master punch die has been made, molds can be duplicated to the limit of die life.
- Third, assuming a constant-chord, constant-section blade, any length of blade can be handled simply by punching out more laminations.
- Fourth, if the blade calls for twist, the mold itself can be twisted and reclamped in the correct position to build-in the angular distribution along the blade.

Patent applications protect many of these tools and processes, including the mold.

Prewitt's shop is set up so that the more complex operations are performed by subcontractors with specialized tooling. The steel nose spar, of D-section, is drawn by the Elwood Ivans Tube Works, Philadelphia. The stiffener sheet, a punch-press operation, is supplied by Arrow Tool and Die, Philadelphia.

▶ **Skin Stock**—Production of the blade begins with treatment of the skin stock, which is 0.010 stainless steel. It is received in coils of 36-in. width, and moved through a special machine which cleans the stock degreasing and drying; it then coats the stock on one side with the metal bonding adhesive. The adhesive is known by several trade names; Prewitt uses FM 45, supplied by Bloomingdale Rubber Co., Chester, Pa.

After coating, and while the stock is passing through the machine, it is dried and coiled again.

This single machine treats enough metal in 24 hours to make 150 blades for the Piasecki HUP-2.

▶ **Nose Spar**—Paralleling the skin treating is the preparation of the nose spar for assembly. The spar is received warped, in the "as drawn" condition. So the first step is to straighten the piece. This is a rather tricky process, because of the D-section shape of the spar. But some special rolling techniques developed by Prewitt handle the straightening process nicely.

After inspection and trimming to length, the spar is twisted. Tooling for this step is typical of the ingenuity used throughout the plant in the development of simple jigs, molds and fixtures.

The spar twister is made from an I-beam, a plumber's pipe vise and half a Ford transmission. The I-beam is the rigid frame of the tool. The spar is clamped at its round end in the pipe vise, and the tip is inserted in a circular die fastened to the transmission drive shaft. By manually turning the transmission axle, the spar is twisted.

After this, it is cleaned, heat-treated and jig-drilled for the installation of tip balance weights. For final preparation, the spar tube is sand-blasted, cleaned again, oven-heated and dipped in adhesive.

▶ **Leading Edge**—In preparation for the first assembly step, the skin leading edge has to be formed to a radius. Again, ingenuity has found a substitute for the expensive brake normally used to do the job. A simple plywood table has been built, with a hinge along its centerline. The skin is placed on this table, and the table is folded until the edges of the sheet match. Then the edges are clamped, and the table lowered. With the sheet restrained by both edges along a single line, a heavy steel roller is placed at the match line and rolled forward manually just far enough to put a permanent set of correct radius into the nose section.

The internal stiffener sheet must also be prepared for the first molding process. The sheet is received in a chemically cleaned state from the vendor. It is then placed in fixtures which hold the sheet extended, and seven to ten coats of the bonding adhesives are painted on. Right now, this is brushed on by hand, but Prewitt is investigating a faster approach which would probably involve a roller method of application.

▶ **First Assembly**—In building the blade, the three basic components—spar, stiffener and external skin—are first tacked together.

With this tacking complete, the trailing edges of the skin sheets are coated

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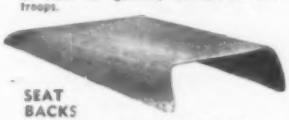

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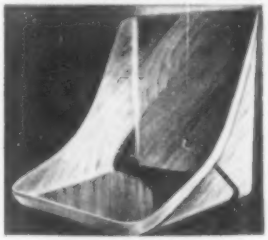

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with more adhesive before the main molding process. After coating, an inflatable rubber bag is fed through the open space between stiffeners, in a spanwise direction. Last, a U-shaped trailing-edge strip is placed in the assembly.

The whole works then goes to the main mold for final bonding and curing. With the mold locked in place, the bag is inflated and the mold heated for the correct bonding cycle. During this process, the stiffeners are stuck thoroughly to the skin, and the earlier tack-molding is further cured.

Cycling time for the main molding process is about evenly divided between set-up and bonding. One reason for the length of the bonding time is that the mold must be brought up to temperature, held there, and then cooled uniformly to a temperature at which the assembly can be removed from the mold.

▶ **Final Steps**—Once out of the main mold, the blade can be trimmed, after which it is inspected. This is only one of a series of continuing inspections which control processes and dimensions throughout.

Zinc-chromate base finishes are sloshed inside the blade to protect the internal surfaces against corrosion. Blades are racked at an angle and allowed to drain.

Fabrication of the blade assembly continues with the installation of a root bulkhead and a faired tip. Skin doublers, some clamps and other root fittings remain to be added.

The HUP blades leave this step complete with hub attachment fittings, ready to install on the copter. Only remaining operation is balancing and final inspections.

▶ **Balance Sheet**—Balance checks are made first in a chordwise direction and then spanwise. For chordwise checking, the blade is suspended at about the spanwise center of gravity. Spanwise balancing of the blade is done with its outboard end protected from stray air currents by a canvas tent over the major portion of the blade. These blades are checked to the limits of a master blade.

This is, of course, only static balancing. But the uniformity of the blades is such that static balance is equivalent to dynamic balance, Prewitt claims. It is not necessary to replace all blades on a rotor head to get dynamic-balance insurance. It is inherent in the dimensional stability of the Prewitt blade.

Final step in the processing sees the blade through three sets of inspectors—Prewitt's, the Navy's and the prime contractor's. The blades are then racked for delivery.

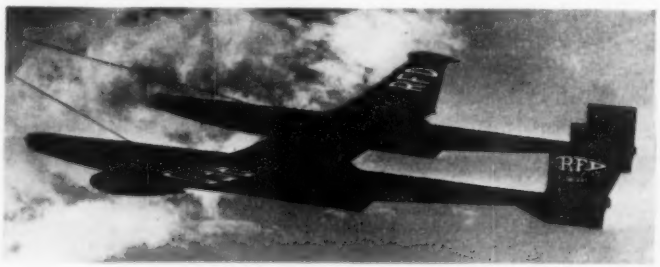
▶ **Room for Expansion**—Prewitt has enough orders on hand for the HUP blades to keep production rolling in its two factory areas. But there is room for expansion—and the activity around the plant shows the first signs of bigger blades to come. In addition to the HUP production line, there are developmental blades under way for both Navy and Air Force.

The company's blades have been used with both basic types of rotor propulsion—mechanical transmission at the hub and reaction propulsion at the tip. They have been fabricated in chord sizes from 5 in. to 28 in.

Prewitt's process is ideally suited for an expanding industry; high production potential was designed into each step. The adaptability of the mold for blades of varying twist, or increased span, and the simplicity of mold construction are unique features of the process.

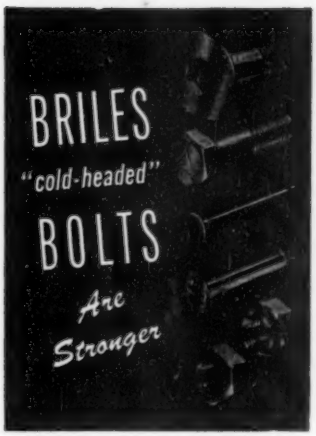
Prewitt himself was the guiding hand for the whole program from start to current status, but he gives much credit to the active support and technical contributions of the military services and his associates in the company.

These people are rotary-wing aircraft enthusiasts. They feel that the Prewitt blade will play an important part in the expanding civil use of the copter.



BORN TO BE KILLED

Latest version of the winged target built by the RFD Co., Ltd. of Godalming, England, has been towed at speeds up to 420 mph. Craft is all-wood construction and of conventional form. A continuation of joint development effort by RFD and its Swedish associate, Aktiebolaget Flygmal, the target is to be made radar-responsive. Higher performance is expected with further development.



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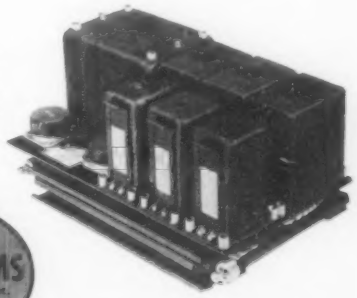

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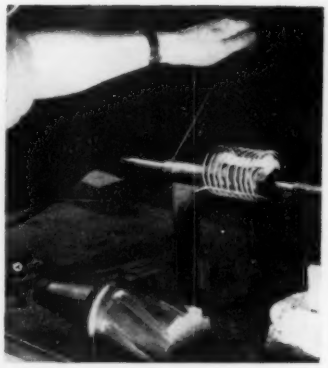
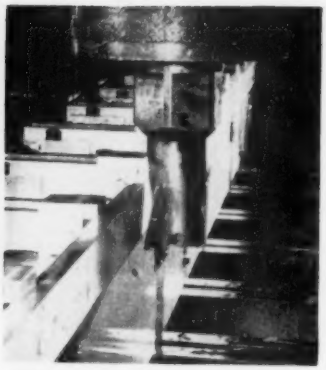


CARBIDE INSERT, at 2,200F in induction heater coil, is manually twisted and bent by Boeing-designed tool to proper angle.



END-MILL CUTTER of helical carbide revolves at 10,500 rpm. on a spar mill at Boeing-Seattle.

Helical Cutters Are Formed Faster

A mechanical bender-twister developed by the Boeing Airplane Co. shapes helical carbide cutters which formerly had to be shaped by hand with losses of approximately 25%.

The bender-twister works inside the turns of an electronic induction-heater coil. With the heat developed internally in the carbide itself by the radio waves from the heater, temperature of the carbide insert can be raised quickly to 2,200F and held there automatically while the insert is bent and twisted to fit the rotary tool body (picture shows manual forming).

► **Previous Method**—Before Boeing developed this method, the carbide bar had to be placed in a vise and heated using an oxyacetylene torch. The operator could only judge the temperature of the carbide by color and he had to avoid heating it above 2,300F because the cobalt binder "boils out" above that temperature and deteriorates the carbide.

With one end of the bar in a vise, the other end would be grasped with a pair of pliers and gradually twisted the desired amount. Then the pliers were used again to bend the bar edgewise. Approximately 25% of the helical carbide inserts were ruined when made out of standard stock by this method, either from incorrect bending or twisting or from exceeding the temperature limit. Results were not uniform.

The carbide bar, when laid obliquely across the rotary tool body, must be bent as well as twisted so the finished tool will make a flat cut. Otherwise its ends would be "high" and the tool would make a cut which would be rounded-up in the middle.

Boeing was forced into this development because carbide manufacturers do not make inserts shaped to fit helical tool bodies. Boeing likes the helical cutter because it cuts metal faster, requires less time for machining, uses less power and needs less maintenance than a straight-edge cutter.

► **Fast Cutter**—The helical cutters are used in the machining of wing spars, fuselage stiffeners and other portions of jet bombers. A helical carbide cutter can make a 1¼-in. cut 76 ft. long in a wing stiffener, varying in depth from .0625-in. to .400-in. in seven minutes, during one trip through the mill, with a 100-micro-inch finish. This compares with 20 minutes required by a straight-edge carbide cutter or 45 minutes by the old high-carbon-steel helical steel cutters, and neither could hold the desired tolerances.

In another instance at Boeing, a spar made of 4340 steel, heat-treated to 180,000- to 200,000-psi. strength was machined with a helical carbide end-mill cutter, removing more than 600 cu. in. of material on a contoured surface, with a finish of 32 to 40 micro-inches. The cutter was run at a speed of 200 surface feet per minute while the tool was fed to the spar at the rate of ten inches per minute. Until this cutter was developed, such a fine finish was virtually impossible on such a wide face cut.

► **Other Advantages**—The helical cutter uses less power than a straight-edge because of the angle of the helix to which the cutting edge conforms, usually 15 or 20 deg.

Although the helical cutters operate at speeds of 3,600 to 10,000 rpm., their tool life is about three times that of a straight-edge cutter.

After Boeing has done further research on the shaping of helical carbide cutters, it expects to turn the information over to carbide manufacturers.

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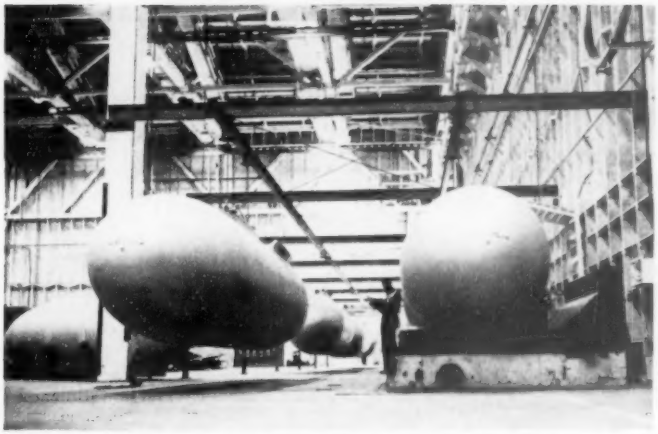


HUGE TANKS, after protective spray, hang from conveyor before shipping.

Ryan Welds Giant External Tanks

Smooth cylinders with more than 30,000 electric spot welds possibly are destined for use on B-47s.

Ryan Aeronautical Co. is making what it claims are the largest external fuel tanks now in production. These giant aluminum alloy cylinders, possibly for the Boeing B-47 bomber, are finished to acrodynamic smoothness with more than 30,000 electric spot welds.

The company has had to dig deep into its resistance welding know-how to get the lines moving on this job. Production was complicated by several factors:

- **Gas-tight construction**, by welding alone, was required.
- **Tanks were too big** for standard welding equipment.
- **Commercial cleaning compounds** did not work satisfactorily with the special aluminum alloy.

▶**Welding Equipment**—Giant seam and spot welders, operated by two-man teams, were chosen to handle the joining job. One man operates the machine, one controls the work feed.

The work is moved by a Ryan-devised system. Overhead monorails load the tank sections on track-mounted steel dollies. The dollies track the sections to the welding machines.

The company's engineers have worked out a neat way of welding straight seams on the tapered end sections of the tanks. Rollers in the dollies rotate the sections while one of the team members yaw the sections by means of a hydraulic cylinder in each dolly.

The huge Federal welders have a 60-in throat depth and can spot nine welds per inch, at the rate of 200 each minute. The equipment can exert a squeeze of over 10,000 lb. per in. while taking 120,000 amperes. Four pairs of these welders are used on the tank project.

▶**Leak-Tight**—Making leak-tight joints by welding is a critical job. Uniform behavior of the equipment is essential. Impurities on the sheets being joined, or their improper cleaning, can change the welding resistance, resulting in poor welds or in holes in the metal.

The cleaning problem was solved in the Ryan development lab, with the production of Raco 34, which removes oxide film from the alloy. Surface resistance of 10 to 15 microhms is attained, safely below Ryan's stop limit of 50.

FEDERAL WELDERS, used on the giant fuel tanks, have deep 60-in. throat, can spot nine welds per inch at a rate of 200 per min.

All sheets are welded within 24 hours of cleaning. In addition, X-ray and tensile tests are regularly made of sample welds. Each finished section is tested for leaks in special jigs with 3½ psi. pressure.

▶**Tank Construction**—The tanks are simple in design. No longitudinal members and very few bulkheads are used, according to Ryan.

Circumferential joints are closed with two rows of spot welds and one row of seam weld. Automatic Heliarc machines are used for fusion welding of the single longitudinal seam which runs through the individual tank sections.

This seam is no thicker than the metal and does not require splice plates, according to the company.

The aluminum alloy used is a high-strength type of good ductility, with no cladding.

Props Get Hard Nickel Coating

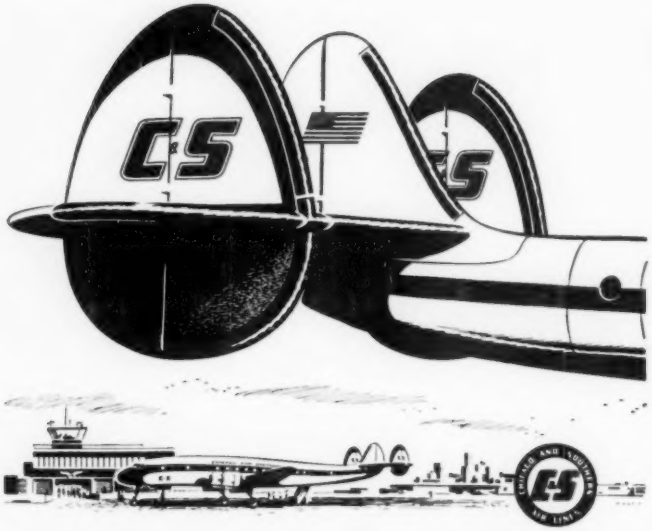
Duraluminum propeller blades have been successfully coated with nickel in a new process developed jointly by the Hamilton Standard division of United Aircraft Corp. and the Bart Laboratories Co., Inc., of Belleville, N. J.

Service use of the "Alni-Clad"-coated blades on the Martin P5M-1 and the Grumman UF-1 have conclusively demonstrated the protective ability of the coating, according to the sponsoring companies.

▶**Joint Development**—The process, which has been the subject of two years' joint effort by Hamilton Standard and Bart for the Air Force and Navy, is claimed to give a stress-free, hard and resilient coating. A synthetic rubber compound developed by Hamilton Standard is used to bond the nickel plating to the aluminum.

Navy's tests compared plated and unplated blades; the plated ones emerged unscathed, but the unplated blades were "severely eroded." Tests at Hamilton Standard used high-pressure water streams and cinder streams in conditions far more severe than expected to be encountered in service. The coated blades were unharmed, but the unplated blades lost about 20% of their tip area.

S. G. Bart, president of Bart Labs, says the process combines the hardness and corrosion resistance of nickel with the advantages of aluminum. He said that the bond between the organic syn-



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thetic base and the nickel has extremely high tensile strength and will stand up under a wide range of temperatures.

Bond material is sprayed on, and then the blade is plated by the usual process. It takes about 24 hr. to process a component.

Finished pieces have a Vickers hardness of 400-450 and are stress-free. Surface finish is semi-bright and can be polished mechanically or chemically.

Electronic Checker For Foundry Alloys

An electronic system of checking alloying-element content in aluminum alloys in the furnace before casting has been introduced in Great Britain by T. I. Aluminium Ltd., Birmingham.

According to the company, it is possible to make an analysis for as many as 13 elements in less than four minutes; and the analytical work which usually takes six chemists one day can be done by two in one hour.

The new technique is based on an instrument known as the A. R. L. Production Control Quantometer, an electronically operated form of direct-reading spectrograph. It is housed in a special lab in a corner of the foundry under controlled temperature and humidity.

Kaiser Plans New Aluminum Facilities

Some 3 million lb. of critically needed aluminum aircraft parts will be turned out monthly at a new $9-million aluminum extrusion plant which Kaiser Aluminum & Chemical Corp. will build for the Air Force at Halethorpe, Md.

Kaiser has signed a letter contract with the government to engineer and construct the plant, install auxiliary equipment and operate the entire facilities under a lease arrangement. Cost of the plant does not include the two mammoth extrusion presses.

Each 2-million-lb. press, rated at 8,000 tons, will be nearly half again as large as any in operation in the country. With runout table, each press will be 230 ft. long, and capable of extruding structural shapes up to 100 ft. long and 2 ft. wide from aluminum billets weighing over 3,000 lb.

The 310,000-sq. ft. plant will be constructed on a 15-acre site adjacent to the existing Halethorpe extrusion plant near Baltimore.

Signing of the contract represents the company's second venture into the Air Force's current $210-million "heavy press" program. The other is a $17-million facility for two giant forging presses at Newark, Ohio.

NACA Reports

► **Effect of an Autopilot Sensitive to Yawing Velocity on the Lateral Stability of a Typical High-Speed Airplane (TN 2470)—By Ordway B. Gates, Jr., and Leonard Sternfield.**

One bugaboo of high-speed flight in current aircraft is lateral oscillation. In the transonic and supersonic speed range, these oscillations are poorly damped. One way to improve damping is with automatic stabilization; the best type of autopilot for the job is one which applies rudder control proportionate to the yawing angular velocity. In flight tests of the Boeing XB-47, such an autopilot did increase damping of the lateral oscillation.

This technical note is to determine the effects of such an autopilot on the lateral stability of a typical fighter airplane which has been designed for transonic and supersonic speed. Four flight conditions were investigated: Landing at sea level, approach condition at 12,000 ft, and cruise at 50,000 ft, at Mach numbers of 0.80 and 1.2.

The report concludes that the lateral oscillation damping should be satisfactory with the installation of the proposed autopilot. As a matter of interest, calculations were made for a time lag in the autopilot of 0.10 sec. Such a lag had negligible effect on the calculated lateral stability of the airplane.

► **A Procedure for Calculating the Development of Turbulent Boundary Layers Under the Influence of Adverse Pressure Gradients (TN 2478)—By Kennedy F. Rubert and Jerome Persh.**

The more you work with diffuser analysis, the more you realize that it is a problem in calculating boundary-layer development. In aircraft, the boundary layer is usually turbulent and less than half the span of the diffuser channel in thickness. A further complication is that although two-dimensional calculations exist, applications of these methods to the flow in conical diffusers have led to difficulty.

This technical note is a progress report on research aimed at evolving a procedure which would be applicable to conical-diffuser flow.

The procedure has been based on the kinetic-energy equation and on an extended form of the momentum equation. In the development, two efforts were made: To determine the significance of the physical quantities involved through an analytical procedure, and to achieve consistency with results of turbulent boundary-layer research.

Predicted and experimental results from several sources are compared for a number of cases of flow over flat plates,

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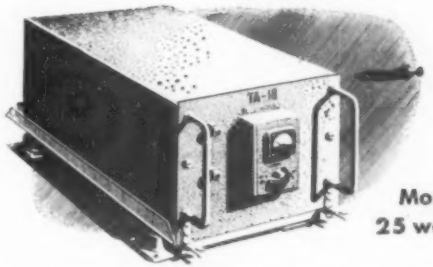

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airfoils and in conical diffusers. For boundary-layer flow before separation, agreement of calculated and experimental values was quite satisfactory. In some instances there was definite disagreement between calculated and experimental results; but the feeling is that these disagreements are not too significant.

The authors believe that good agreement has been obtained in enough instances to justify the continuation of effort along these particular lines.

► **Theoretical Investigation of Submerged Inlets at Low Speed (TN 2323)—by Alvin H. Sacks and John R. Spreiter.**

Among the many contributions to internal aerodynamics made by the National Advisory Committee for Aeronautics, the submerged or flush inlet is outstanding. Such an inlet, whose contours do not project beyond those of the fuselage, is one approach to the problem of getting air into a turbojet airplane. Applications of this inlet have not been many—they include engine air intakes for the Lockheed F-80R, the Ryan XF2R-1 and a variation of the Republic F-84.

Perhaps one of the reasons that the inlet has not been used more is that its design is sensitive to the geometry of the approach ramp, the inclined passageway leading to the duct entrance. The ramp is composed of a floor and two side walls.

The profile and plan-form design of this ramp is a basic problem to the further development of submerged inlets in general.

This report analyzes theoretically the importance of various design parameters and indicates (where possible) methods for calculating their effects on the overall performance of the submerged inlet. Inlets with parallel, divergent, and convergent ramp walls are considered and their fundamental differences discussed. The basic limitation of the report is that the analysis applies to low speeds; that is, the usual incompressible flow theory has been used.

As a result of the analysis, the integrated total-pressure loss in the entrance of a submerged inlet has been broken down into its components. And these can now be calculated subject, of course, to the restrictions of the report.

The analysis draws a qualitative picture of the flow developed in the inlet just ahead of the duct entrance. There are two main sources of pressure losses in the entrance: Floor boundary layer and some portion of the vortex cores. Equations are developed for the losses due to each of these sources.

Discussion of the effects of mass-flow ratio and of compressibility conclude the analytical presentation.

The report concludes that:

- **Boundary-layer losses on the floor decrease** with increasing mass-flow ratio.
- **Internal vortex losses increase** with increasing mass-flow ratio.
- **Therefore, there must be an optimum mass-flow** ratio with minimum combined losses in ram recovery.
- **Therefore, there must also be an optimum divergence angle** for a straight ramp which gives minimum total-pressure losses.
- **Vortex pressure loss** depends upon inlet geometry and local pressure coefficient, and to a lesser extent upon the mass-flow ratio.
- **Ramp boundary-layer losses** are determined by the momentum thickness, the local pressure coefficient, and the boundary-layer-shape parameter.

PRODUCTION BRIEFING

▶ **Aviation Accessories, Inc.,** Ft. Worth, Avionic's maker, has added a 10,000-sq. ft. electrical sub-assembly and overhaul department to its new Ft. Worth factory to specialize in subcontracts for aircraft builders and other military contractors. Company now is completing overhaul and reconditioning of 10,000 T-29 microphones for USAF.

▶ **Bowser Technical Refrigeration,** division of Bowser, Inc., Terryville, Conn., has opened additional 5,000 sq. ft. of production facilities for increased output of flight simulation chambers. Aircraft and electronic equipment are tested in these chambers under varying conditions of humidity and temperature.

▶ **Engineering Research Associates, Inc.,** St. Paul, has received USAF contracts for directional gyro indicators and has leased 11,000 sq. ft. of additional area to accommodate the program.

▶ **Carl Hirschmann Co.,** Manhasset, Los Angeles and Milwaukee, has been named exclusive U.S. representative for Ebosa, S.A., Switzerland, makers of thread turning and chasing machines, second-operation and precision measuring machines. Hirschmann has also been appointed agent for Technica, A. G., Switzerland, to handle its Type 1100 vertical milling machine.

▶ **Lockheed Aircraft Corp.,** Burbank, expects its Southern California labor force to rise to about 33,000 workers by next year, from 27,500 employed now. Super Connie force will increase from 6,100 to about 10,500. Company delivered last of 20 two-place T-33 jet trainers to RCAF.

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Plastic Foam In Control Surfaces

Plastic-foam-filled control surfaces, possibly intended for use in the long-range Snark guided missile, have been developed at Northrop Aircraft, Inc.

No internal ribs are required with the new design, the number of rivets has been minimized, and surfaces can be built with greater strength for less weight than conventional designs.

The new Northrop process uses Styrofoam as a filler. It is a hard plastic foam developed from polystyrene by the Dow Chemical Corp.

▶ **Reasons**—Northrop process engineers, headed by T. E. Piper, had been considering the use of Styrofoam because of the promised weight saving and elimination of surface vibration. In this latter feature, the Styrofoam acts as a damper by filling the voids within control surfaces and removing the possibility of skin "oil-canning," for example.

One of the keys to the successful use of Styrofoam was the development of an adhesive for bonding the plastic to metal. This adhesive permits the use of Styrofoam with wood, glass laminates, fabric, aluminum or other metals, says Northrop engineers.

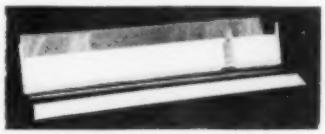
In common with other metal adhesives, Northrop's is brushed or sprayed on, depending on surface size. It is applied to all mating surfaces and sealed by pressure contact.

A bag of PVA (polyvinyl alcohol) makes the pressure contact between working surfaces. The bag is made large enough to cover the entire surface using the foam filler. A vacuum pump exhausts the air from inside the bag, and the pressure of bag against surface provides the force for sealing.

Laboratory processes have handled areas as large as 3x13 ft. with this method.

▶ **Design Advantages**—Northrop says that use of the plastic foam as a substitute for ribs cuts weight up to 10% on control surfaces which are as much as 15% larger. Strength is increased up to 10%. These comparisons are made with conventional built-up surface construction.

Tooling is eased: the jigs and fixtures required for ribbed surfaces are largely eliminated. There are further manufacturing economies which result from reducing the number of rivets.



STYROFOAM FILLER eliminates vibration in control surfaces. Its use saves weight, eliminates internal ribs, reduces number of rivets. Sheet of the plastic lies alongside the sample panel above.

Northrop's process engineers feel that the continuous bonding of the Styrofoam surfaces makes them considerably stronger than ribbed surfaces of comparable size. One typical surface, designed to a load factor of 1.5 went to a factor of better than 3.0 in lab tests. In attempting to test to destruction, failure occurred in one of the test stand fittings and the surface could not be destroyed at that time, Northrop pointed out.

▶ **Application**—The listed advantages of foam-filled surfaces—weight-saving, strength improvement, manufacturing economy, freedom from vibration—point to their use in high-speed aircraft. Pictures of the surfaces developed by Northrop show them to be of constant chord, a type of surface not in use on Northrop's current production project, the F-89 Scorpion.

These surfaces could be test specimens, made with constant chord for reasons of design. But they could also be representative of future practice for more advanced types of Northrop aircraft, such as the Snark guided missile.

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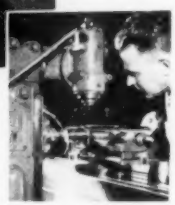
Young ladies, like young flowers, bloom their loveliest in springtime. The flowers—well, we forget their colors, but we remember well that Dorothy Jean Warren's eyes are grey and her hair brown. She is 17 and is head cheer leader and senior favorite in her high school. (No. 8 in a series of pretty Dallas girls discovered and photographed especially for Southwest Airmotive.)



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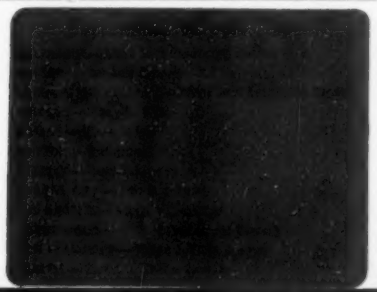

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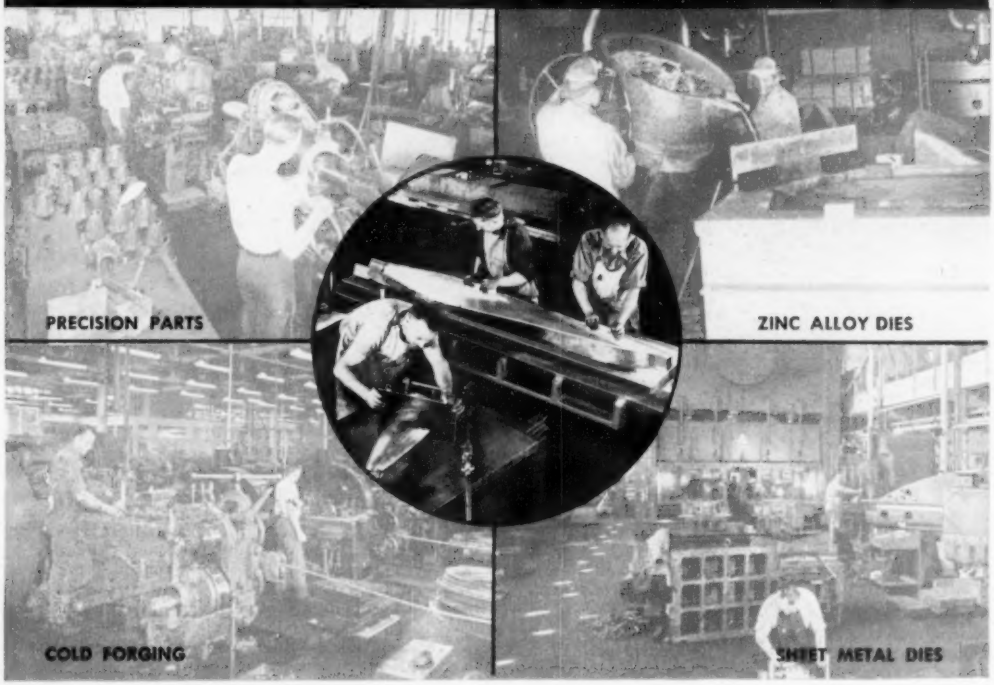

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Accelerated tax amortization for manufacturers expanding their defense facilities is granted by the government in the forms of certificates of necessity.

In the following list of recent certificates, company name is given, followed by product or service, cost of construction deemed necessary for defense expansion but of no likely civilian use after the emergency, and the percentage of the expansion cost allowed for fast tax write-off. Fast write-off permits property to be depreciated in five years.

- **Niles-Bement-Pond Co.**, Warwick, R. I., aircraft engine parts, $371,293, 65%.
- **Raytheon Mfg. Co.**, Boston, electronic equipment, $15,586, 65%.
- **Homer D. Bronson Co.**, Beacon Falls, Conn., aircraft parts, $80,000, 80%.
- **United Aircraft Corp.**, East Hartford, Conn., aircraft parts, $111,095, 65%.
- **United Aircraft Corp.**, Windsor Locks, Conn., Aircraft parts, $1,352,349, 65%.
- **Westchester Color Co., Inc.**, Larchmont, N. Y., parachutes, $15,131, 50%.
- **Anderson Aircraft, Inc.**, New York, aircraft fuselage panels, $426,600, 65%.
- **Accurate Products**, Hillside, N. J., tools, dies and jigs for aircraft parts, $21,910, 70%.
- **Port Chester Mfg. Co.**, Port Chester, N. Y., parachutes, $15,613, 50%.
- **Art Metal Construction Co.**, Jamestown, N. Y., aircraft assemblies, $53,923, 65%.
- **Watson Flagg Machine Co., Inc.**, Paterson, N. J., gear motors, aircraft and marine, $322,626, 70%.
- **Wollensak Optical Co.**, Rochester, N. Y., aircraft parts, $271,361, 65%.
- **J. S. Thora Co.**, Holmesburg, Pa., aircraft landing mats, $104,471, 65%.
- **Aircraft-Marine Products Inc.**, Cumberland Co., Pa., aircraft and electronic equipt., $160,137, 50%.
- **Fairchild Engine and Airplane Corp.**, Hagerstown, Md., aircraft, $500,000, 65%.
- **Holley Carburetor Co.**, Van Dyke, Mich., aircraft parts, $9,654, 65%.
- **National Machinery Co.**, Tiffin, Ohio, machine tools, $135,192, 65%.
- **Teer, Wickwire and Co., Jackson, Mich.**, ordnance and aircraft parts, $49,093, 70%.
- **Standard-Thomson Corp.**, Vandalia, Ohio, aircraft parts, $2,465,338, 70%.
- **Brickner-Kropf Machine Co.**, Muskegon Heights, Mich., dies for prod. of ordnance and aircraft parts, $14,432, 65%.
- **Bosworth Steel Treating Co.**, Detroit, heating treating aircraft parts, $69,382, 50%.
- **W and B Tool and Engineering Co.**, Detroit, fixtures, gages and aircraft parts, $127,069, 70%.
- **Metalco, Inc.**, Jackson, Mich., aircraft parts, $135,736, 50%.
- **Holley Carburetor Co.**, Detroit, aircraft parts, $9,943, 70%.
- **Swedlow Plastics Co.**, Youngstown, Ohio, aircraft parts, $13,609, 60%.
- **Bunell Machine and Tool Co.**, Cleveland, aircraft parts, $151,692, 75%.
- **R. H. Freitag Mfg. Co.**, Akron, aircraft parts, $126,517, 70%.
- **Farm Tools, Inc.**, Cleveland, aircraft parts, $121,996, 70%.
- **Burroughs Adding Machine Co.**, Plymouth, Mich., aircraft instruments, $715,250, 65%.
- **Clark Grave Vault Co.**, Columbus, Ohio, aircraft parts, $232,100, 65%.
- **Configured Tube Products Co.**, Chicago, aircraft parts, $22,572, 75%.
- **Perfex Corp.**, Milwaukee, aircraft parts, $18,911, 65%.
- **General Motors Corp.**, Bedford, Ind., aircraft and parts, $1,778,950, 65%.
- **Paramount Textile Machinery Co.**, Kankakee, Ill., aircraft parts, $11,985, 65%.
- **Indiana Gear Works, Inc.**, Indianapolis,

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• **Champion Motors Co.**, New Brighton, Minn. aircraft parts, $20,626, 80%.

• **Beech Aircraft Corp.**, Wichita, aircraft wing assemblies, $123,773, 65%; aircraft fuselage assembly, $81,680, 65%.

• **Intercontinental Mfg. Co.**, Garland, Tex., aircraft parts, $38,829, 70%.

• **Crown City Precision Grinding Co.**, Pasadena, Calif., aircraft parts, $21,291, 80%.

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• **Lovequist Engineering Co.**, Los Angeles, aircraft parts, $24,225, 75%.

• **Fenwal Inc.**, Ashland, Mass., aircraft parts, $36,309, 65%.

• **Hansen Engineering and Machinery Co.**, Lynn, Mass., aircraft and ordnance parts, $22,350, 80%.

• **Electrix Corp.**, Pawtucket, R. I., aircraft and ordnance parts, $27,141, 80%.

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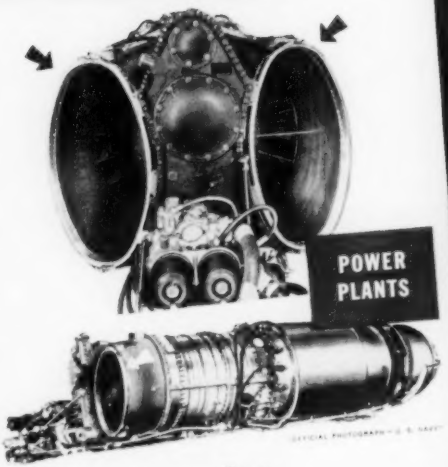

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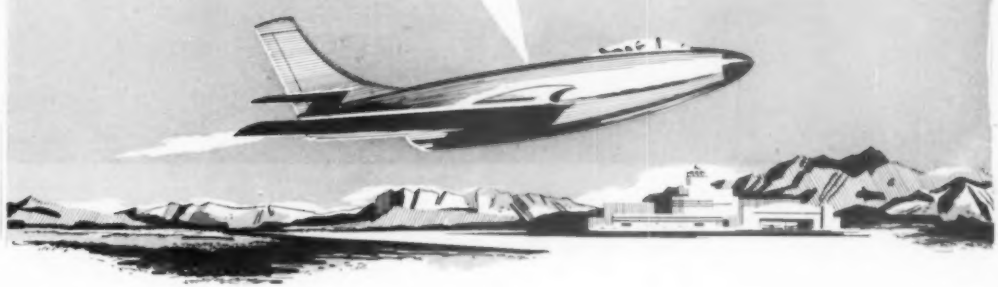

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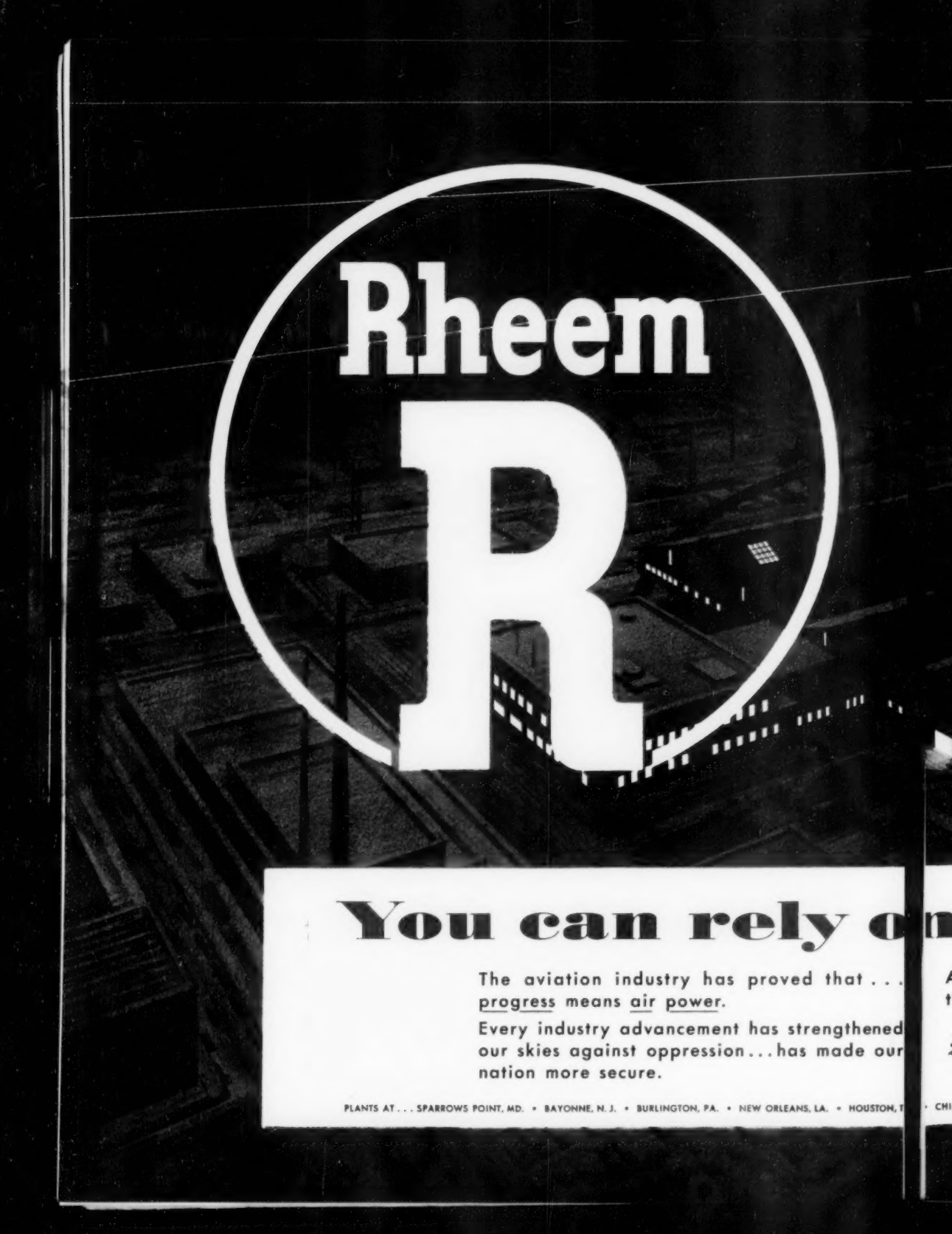

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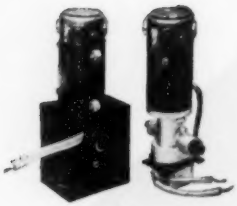

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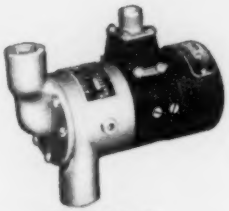

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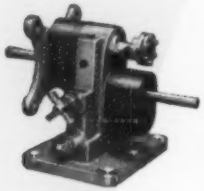

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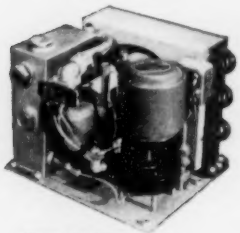
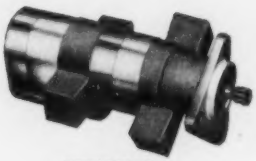


HEAT TRANSFER UNIT



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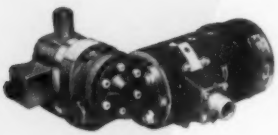

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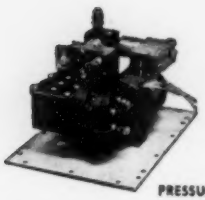

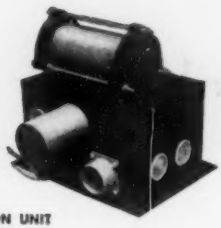

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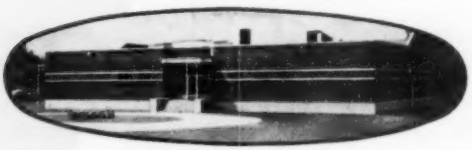

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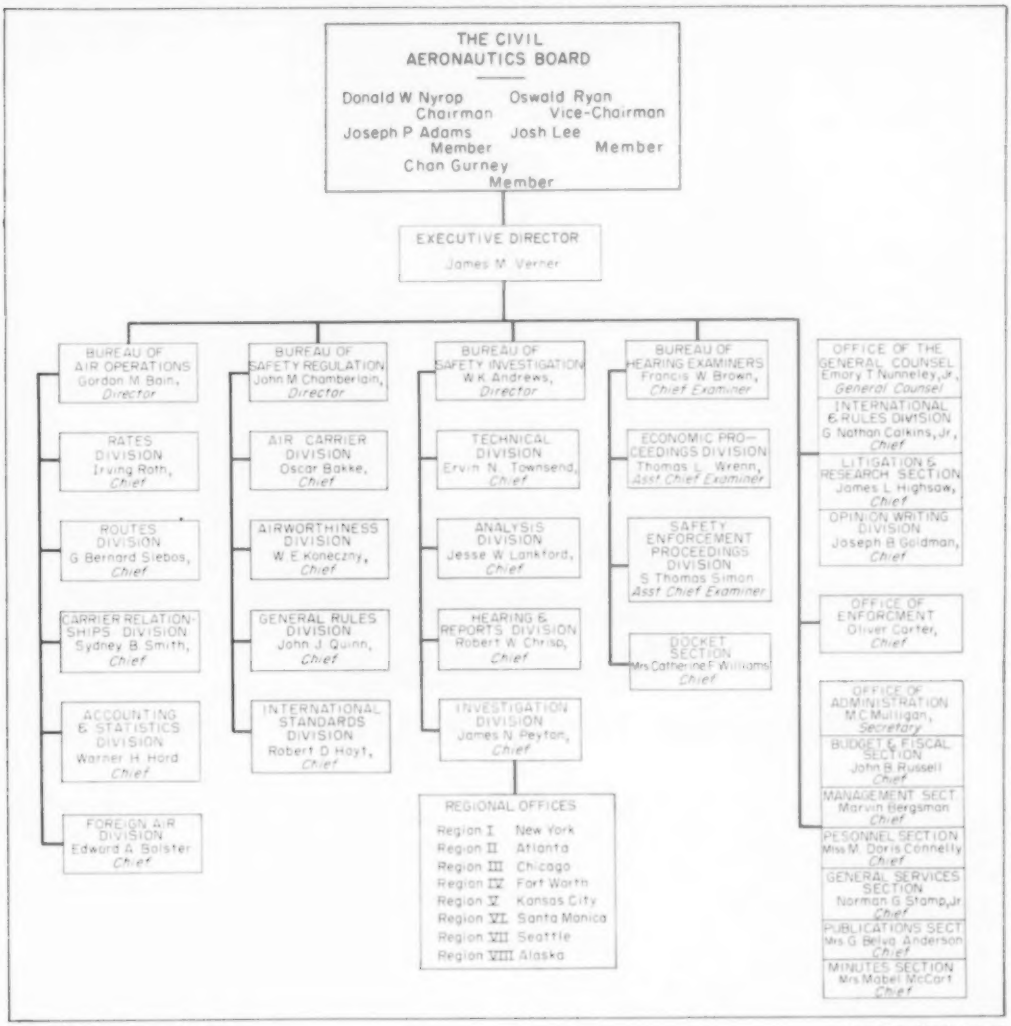
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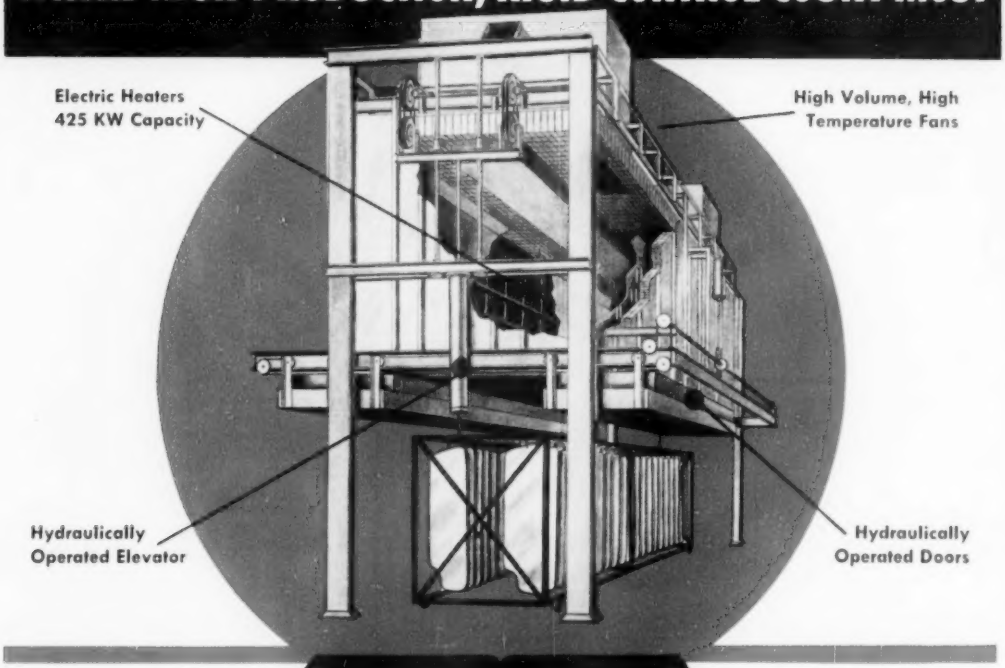

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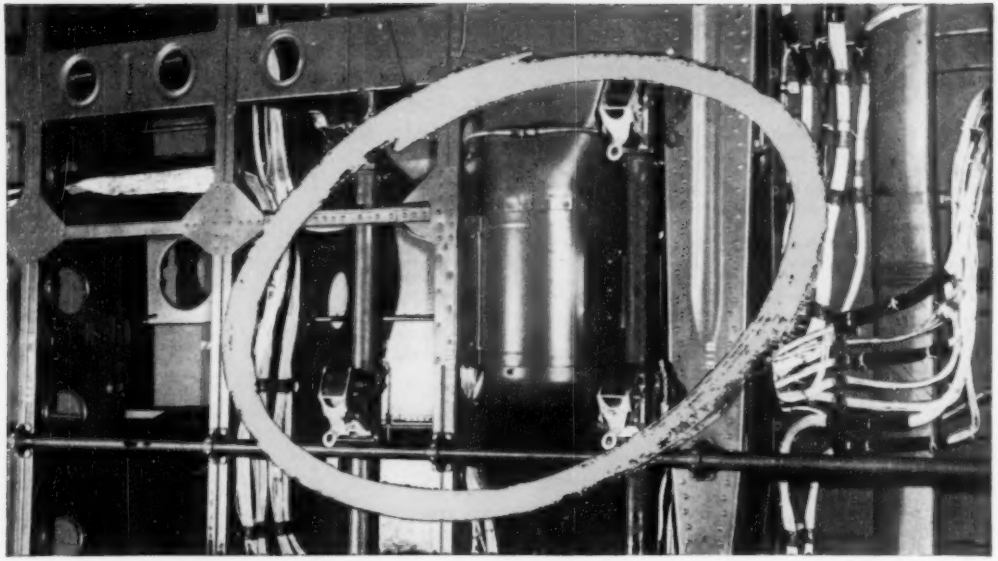

JOY AXIVANE® AIRCRAFT FANS
provide ice-protection for Parked Packets

The Fairchild Packet must be ready at all times to carry airborne troops or supplies to forward areas. The wings of parked aircraft, however, sometimes become coated with ice or frost which may literally stop them cold. To minimize this possibility, Fairchild engineers designed a forced hot-air system for wing-panel de-icing while the plane is on the ground. Two Joy AXIVANE Aircraft Fans supply combustion and ventilating air to eight 400,000 BTU heaters. The heated air can be valved either into the wing panels or into the cargo and cabin space. No space is wasted by the fans, since their compact size permits them to be installed between the vertical fuselage frames.

Each of these highly-efficient 1.5 H.P. fans produces 1100 C.F.M. at 5.5″ static pressure, yet weighs only 22 pounds and is only 9″ in diameter. A & N design specifications. Superior features of all Joy Aircraft Fans are compact design, shock-resistant strength, minimum operating noise, and the most favorable air volume-to-weight and electric-to-air power ratios.

● Joy designs and builds each fan to the exact requirements for which it is intended. Each fan, therefore, is custom-engineered for highest efficiency. For many purposes stock fans can be supplied from the extensive line already designed. Both single and two-stage units available. Optional features include straight or flared inlets, beaded or flanged connections, radio noise-filters, anodization, and cooled motors where required.

Here are some of the many uses for Joy AXIVANE Aircraft Fans: Windshield de-frosting, windshield or wing de-icing, cabin heating, cabin ventilating, cockpit heating, cooling radio and electronic equipment, cooling voltage regulators, oil cooling, gear-box cooling, instrument cooling, air recirculation, and high-altitude pressurizer boosting.

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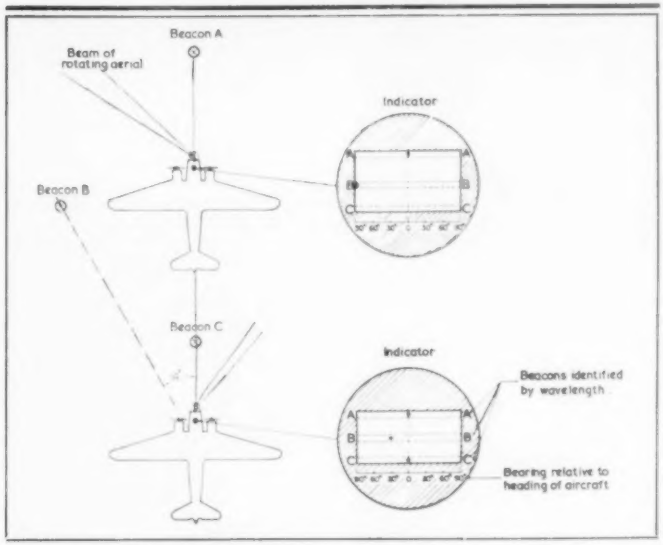


RELATIVE LOCATION of beacon blips on scope determines plane's position.

Low-Power Beacons for Navigation

Australian microwave system plots several stations to fix position; can be used for marking obstacles.

(*McGraw-Hill World News*)

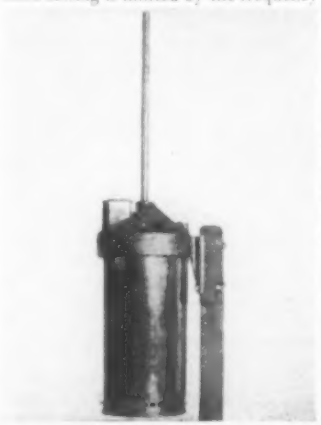
Melbourne—A microwave navigation system, using low-power continuous-wave ground beacons, operating at fixed points in the 3.2-cm band, has been developed in Australia and successfully flight tested by scientists of the Radiophysics Division of the Commonwealth Scientific and Industrial Research organization.

The system is applicable to route navigation, obstacle marking, and to assisting the pilot in holding procedures near airports. Its operation in the microwave region is said to offer the advantage of freedom from radio interference, and its design permits the use of several simultaneous beacon presentations.

Current developmental models have ranges of 80 to 100 miles, line-of-sight permitting, with performance virtually independent of weather conditions.

▶**Visual Data**—The system's navigational information is provided to the pilot on a 3-inch panel-mounted cathode ray tube. Each of the several beacons within range appears as the familiar "blip," whose horizontal position on the scope either side of center represents that beacon's azimuth position relative to the aircraft's heading. The identity of each of the several beacons is established for the pilot by the vertical position of its "blip" on the scope.

The number of beacons which can be presented simultaneously at any band setting is limited by the frequency



OMNIDIRECTIONAL microwave ground beacon has up to 100-mi. range.

Dependable

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LANDING GEARS
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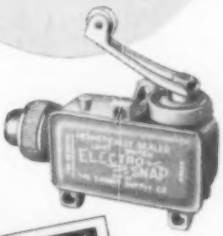
and other Aircraft Units



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HERMETICALLY-SEALED LIMIT SWITCH

COMPLETE DEPENDABILITY IN ANY ENVIRONMENT

Hot or cold . . . dry or humid . . . in the air or on the ground the new ELECTRO-SNAP Hermetically-Sealed Limit Switch will function perfectly. That's because it has its own atmosphere (an inert gas) sealed in . . . to make its operation absolutely impervious to dust, temperature or moisture conditions—and no tampering or misadjustment is possible.

The "Teflon" cover on the diaphragm prevents any possibility of jamming by ice adhesion. And because of its tipping motion—no external sliding parts—it will free itself of ice accumulation and allow reset without help.

Write for free sample Basic Switch and data sheet on Electro-Snap Hermetically-Sealed Limit Switch H-203G.

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Electrical Components
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- Industrial limit switches
- Momentary-pulsing limit switches
- Push-button and lever-type actuators

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Manufacturers of Precision Electrical Controls

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- ☐ Airplane & Engine Mechanic
- ☐ Aircraft Electrician
- ☐ Sheet Metal Mechanic
- ☐ Sheet Metal Layout Man
- ☐ Aircraft Radio Installer
- ☐ Aircraft Radio Mechanic
- ☐ Inspector
- ☐ Clerical
- ☐ _____

AIRCRAFT aerial with cover removed.

sweep of the receiver (30-mc. for the experimental equipment), and by the frequency stability of the individual beacon stations. With present equipment, a spacing of 7.5 mc. is adequate, as it permits the use of five simultaneous beacon presentations.

Beacon signals are received by a narrow-beam rotating antenna mounted in the nose of the aircraft, capable of scanning through 180 degrees in azimuth for frontal coverage. The antenna has 90-deg. vertical coverage from horizontal down to the nadir.

From the presentation of a single beacon on the scope, the pilot can determine the bearing of a known point relative to his aircraft. Two or more beacons will define a straight track for the pilot. Flight tests have shown system resolution errors of two degrees maximum when homing on a single beacon.

Water Cooler

- **New J&H alternator uses vaporization cooling.**
- **This helps to maintain high-altitude output.**

The sight of steam pouring out of a new aircraft alternator designed by Jack & Heintz is no cause for alarm. The new J&H alternator uses water vaporization cooling to prevent alternator power output from falling off sharply at high altitudes and ambient temperatures, a shortcoming of conventional air-blast cooled alternators.

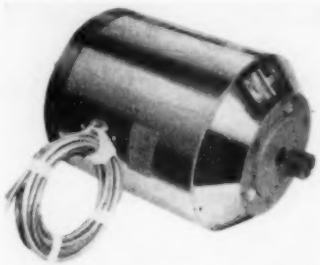
Because a generator's power output is largely determined by its internal temperature, cooling at high altitude air densities and highspeed ambient temperatures is a major problem.

By using vaporization cooling in their new G75 alternator, J&H says, the machine suffers no de-rating above 35,000 ft. where conventional air-blast cooled alternator ratings begin to falter. For some applications, they add, the overall weight of the vaporization-cooled machine is less than that of its air-cooled counterpart of comparable rating.

► **How It Works**—Distilled water from an external thermally insulated reservoir is injected into the alternator's hollow shaft. Centrifugal force then scatters the water through suitably placed orifices onto the machine's internal surfaces. There the water picks up heat, vaporizes (thus cooling the machine), and is then exhausted as steam.

A thermostat in the alternator senses internal temperature and operates a built-in valve to control the flow of cooling water. Since all cooling is accomplished by vaporization, the alternator can be insulated from airplane ambient temperature, which under some flight conditions can be much higher than internal machine temperature.

► **Design Details**—The G75 is a 3-phase, 208/120 volt, 400-cycle, 12,000-rpm. alternator rated at 12 kva., 80% power factor. By admitting more cooling water, the manufacturer says, the G75 can deliver 16 kva. and still maintain satisfactory cooling.



VAPORIZATION COOLING maintains rated output of new Jack & Heintz G75 alternator at altitudes above 35,000 ft.

At its rated output of 12 kva. the unit has an efficiency said to be about 93% and uses about 3¼ lb. of cooling water per hr.

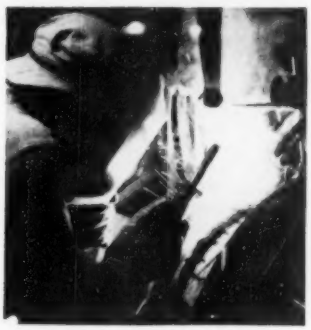
► **Weight Comparison**—It isn't easy to make a direct weight comparison of the new G75 with an air-cooled machine of comparable rating because of the weight of external plumbing, water reservoir and the cooling water. The weight of the water will depend on the length of aircraft mission and average power demands made on the alternator. Both are difficult to predict.

The G75 was developed for a North American Aviation missile in which NAA is furnishing the reservoir and plumbing. Weight of these was not disclosed. Nor could J&H provide a weight estimate of external plumbing that would be required for a piloted aircraft installation.

► **An Estimate**—Comparison of the 39-

CLEVELAND PNEUMATIC landing gear

First in the Field!



To get the best weld on this bomber landing gear column, the parts are preheated by the induction coil shown. Electrode holder is connected in series so that welding cannot proceed until work is preheated to proper temperature.

Advanced manufacturing methods ... basic factor in superior performance

This flash welding machine was designed and built to Cleveland Pneumatic specifications. Nine years of constant welding research have resulted in more than 150,000 flash welds on our Aerol Landing Gear without a single service failure ... Such modern production equipment throughout the entire plant, combined with unexcelled engineering experience, explains why Cleveland Pneumatic landing gear is *first* in the field.

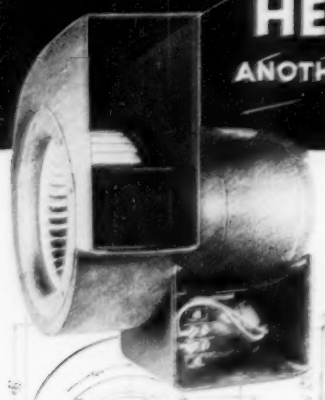
THE CLEVELAND PNEUMATIC TOOL COMPANY

CLEVELAND 5, OHIO

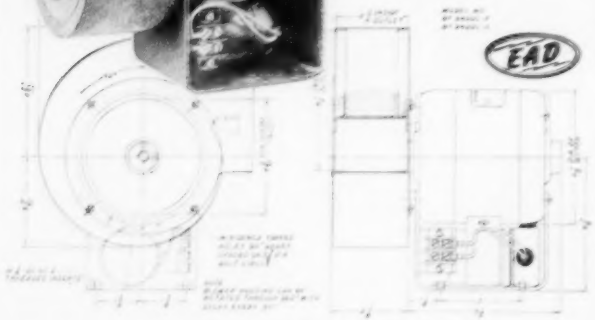
Established 1894

EAD..."TAKES THE HEAT OFF"

ANOTHER ENGINEERING PROBLEM



A compact, highly efficient centrifugal blower for cooling "hot-running" electronic equipment.



SPECIFICATIONS

MODEL NUMBER ..... BF 94 DDL-2

CAPACITY 250 CFM at .5" Static Pressure NAFM
330 CFM at .0" Static Pressure

MOTOR *(Self Cooling—Completely Enclosed)*
⅛ H.P., Capacitor Induction,
120 Volts, Single Phase, AC,
60 Cycles, 3200 RPM,
Clockwise or Counter Clockwise.

MOUNTING ..... Rigid Base

OVERALL
DIMENSIONS ..... 7 27/32" x 8 3/8" x 10 1/8"

Solving special problems is routine at EAD

If your problem involves rotating electrical equipment, bring it to E A D. Our completely staffed organization will modify one of our standard units or design and produce a special unit to meet your most exacting requirements.

EASTERN AIR DEVICES, INC.

585 DEAN STREET, BROOKLYN 17, NEW YORK

lb. G75, however, with a standard J&H air-cooled alternator of 15-kva. rating, weighing about 50 lb. allows an 11-lb. differential for water, assuming that the weight of external plumbing is the same as the weight of air ducting for the air-cooled machine. On the basis of an average power consumption of 12 kva. (80% of a 15-kva. rating) during a mission, it appears that the new G75 is lighter than its air-cooled competitor for missions up to 5½ hr.

For longer missions, added water weight favors the air-cooled machine under the foregoing assumptions. However, this estimate is based on both machines operating below 35,000 ft. altitude where the air-cooled machine is not down-rated. At higher altitudes, the new vaporization-cooled machine should compare even more favorably.

An interesting by-product of the new cooling technique is that the presence of moisture in the machine increases brush life because of the lubricating effect of the steam.

Tiny Transformers

A new line of miniature, hermetically sealed low-frequency transformers and reactors has been announced by Southwestern Industrial Electronics Co.

The units are available as input, interstage, and output type transformers, as well as reactors, and have unusually high inductance for their size, the manufacturer claims.

Other features, according to SIE include twin-coil, hum-bucking construction, shielding of −90 db. or more, and close tolerances on electrical and mechanical characteristics. Standard units are available with ± 5% tolerances; special units to within ± 1%.

Southwestern Industrial Electronics Co., 2831 Post Oak Road, Houston, Tex.

The engineering department that consistently produces the "best" at the right time—B-25, F-51, T-6, now the F-86 *Sabre* jet series, AJ-1, FJ-1, FJ-2, T-28, B-45—offers engineers a real opportunity to become a part of the advance idea teams that are designing today for tomorrow and the future of aviation. Become a part of the outstanding aircraft engineering group in the aircraft industry by writing for complete information on career opportunities at North American. Please include a summary of your education, background and experience.

North American Extras—

Salaries commensurate with ability and experience • Paid vacations • A growing organization • Complete employee service program • Cost of living bonuses • Six paid holidays a year • Finest facilities and equipment • Excellent opportunities for advancement • Group insurance plan • Sick leave time off • Generous travel allowances • Employees Credit Union • Educational refund program • Low-cost group health, accident and life insurance • A company 24 years young.

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- **Stress Engineers**
- **Aircraft Designers and Draftsmen**
- **Specialists in all fields of aircraft engineering**
- **Recent engineering graduates**
- **Engineers with skills adaptable to aircraft engineering**

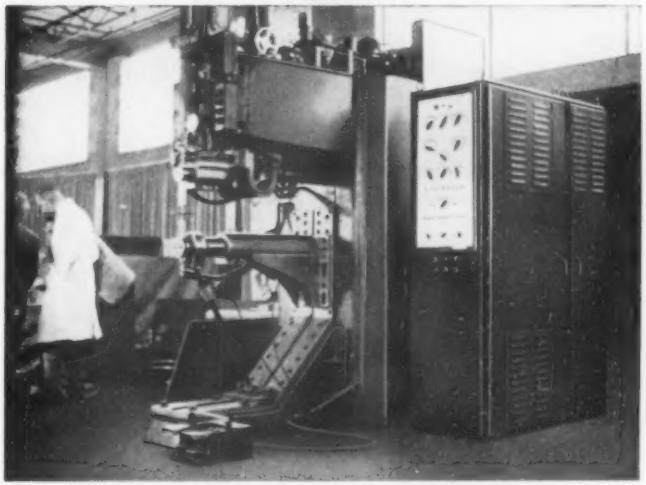
NORTH AMERICAN AVIATION, INC.

North American Has Built More Airplanes Than Any Other Company In The World

Engineering Personnel Office
Los Angeles International Airport
Los Angeles 45, Calif., Columbus 16, Ohio

CONTINUOUS or SPOT WELDING of ALUMINUM

WELTRONIC 3-PHASE FREQUENCY CONVERTER



SCIENTIFICALLY DESIGNED AND BUILT FOR PEAK EFFICIENCY

The Weltronic frequency changer control operates in conjunction with a 3-phase welding transformer distributing the load over the three phases of the power supply. The lower reactive effect results in an extremely high power factor and a low KVA demand.

Frequency converter control minimizes overloaded distribution lines.

The three phase frequency converter type control provides a low rate of current rise which reduces spitting and tip pickup, this providing improved weldability.

Reactance is controlled by a selector switch which in turn assists in the control of welding current. The reactive effect of the machine is reduced approximately in proportion to the reduction in frequency, providing the distinct advantage of being resistance sensitive.

Weltronic three phase frequency converter controls are available for all types of seam and spot welding operations.

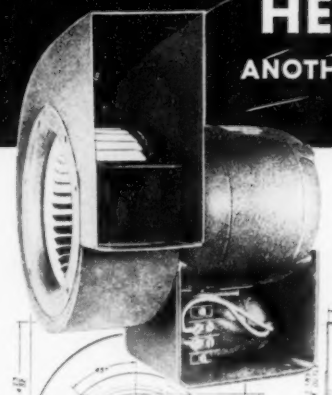
Weltronic converters are in operation in a number of major aircraft plants.

Complete information will be provided on request.

Weltronic Co. 19500 W. 8 MILE RD. Detroit 19, Michigan

EAD... "TAKES THE HEAT OFF"

ANOTHER ENGINEERING PROBLEM



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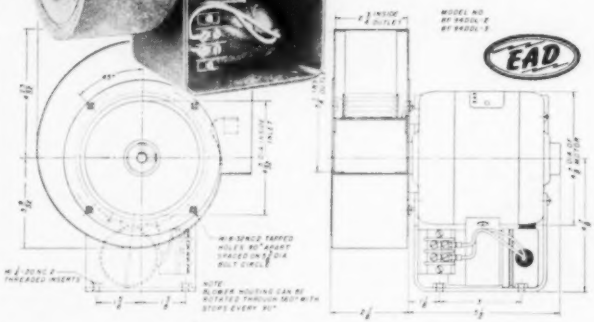

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ENGINEERS — LOOK TO THE FUTURE WITH NORTH AMERICAN

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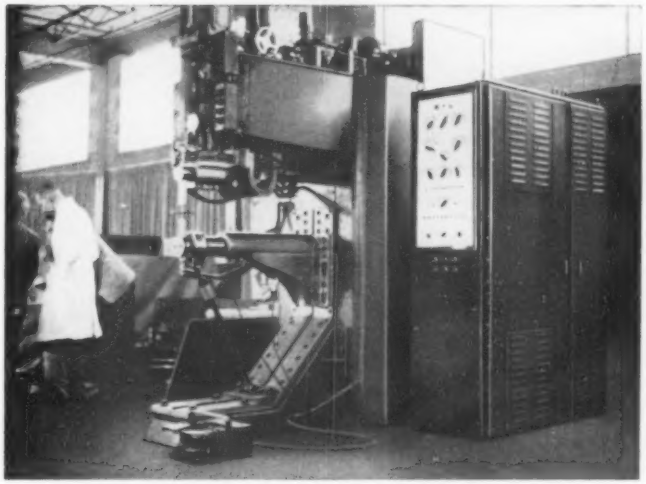

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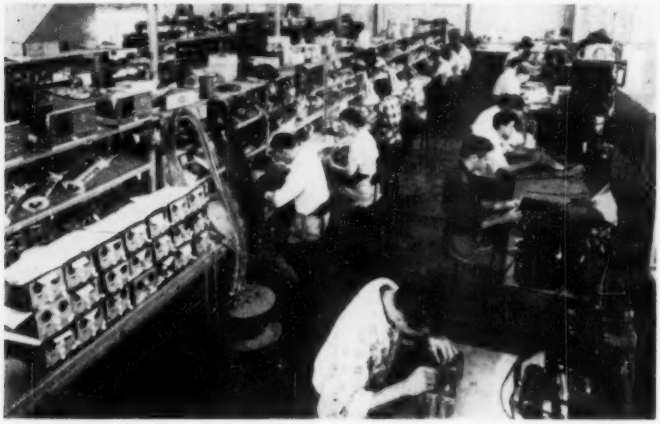


NARCO'S 80 employes turn out about 160 VHF Omni sets a month at Ambler, Pa.

Narco Shows Low-Cost DME Set

New lightweight unit is aimed at the corporation plane market and is expected to make flying easier and safer.

By Scott H. Reiniger

Ambler, Pa.—A low-cost, lightweight DME set, developed under CAA contract for private and corporation aircraft, has been unveiled here by the National Aeronautical Radio Corp. (Narco).

Distance measuring equipment is an important step in making navigation safer and simpler. The new low-cost set, to be available early next year, should bring private flying a step closer for the average **man.**

▶ **Road Sign**—The equipment may be called a road sign of the air. It has a mileage meter on the instrument panel to show the pilot instantly, at any time, how far he is from his destination or a selected station. The display in the cockpit is simple.

The set Narco demonstrated was newly out of the company's experimental shop. It is too early to tell price, but the firm is confident it will cost less when it reaches the market than any other set. As an early comer, the company should have a wide open market to exploit in the small-plane field.

The set is remote-controlled. There is no tinkering with DME frequencies. There is only one knob for the pilot. He uses it to select the identification frequency of the ground omnirange station he is measuring from. In doing this, he automatically selects the proper DME frequency.

The set takes less space on the instrument panel than some of Narco's "glove-box"-size VHF radios. But, at 25 lb., it is heavier. While it can be used in smaller single engine planes, Narco believes its strongest market, at the outset, will be twin-engine corporate aircraft where there is greater tolerance for weights and costs.

▶ **First Step**—Development of the low-cost DME is the first move in a program by the firm to produce a greater variety of products and to introduce these to a wider market—toward heavier executive aircraft and airline planes.

DME includes frequency selector (top) and distance indicator (dial, bottom).

Narco thinks a low-price DME will have strong appeal to nonsked and smaller scheduled airlines and feels a compromise in cost and performance can be reached with these operators.

▶ **How It Works**—The equipment operates something like a radio altimeter, telling distance by projecting radar beams to the selected omnirange station and measuring the time it takes them to bounce back.

Toward the low end of the scale on the mileage indicator, the set is accurate within a mile. At the high end, it is accurate within five miles, the company says. Overall operation "exceeds CAA requirements by a good safe margin," according to Jim Riddle, Narco's president and former Radio Corporation of America man.

Operating in the ultra high frequency band, the set is a microwave type consisting of five components—the DME radar ranging unit, DME transceiver, distance indicator, frequency selector and power supply. Ranging unit, transceiver and power supply are consolidated in one compact box. The indicator and frequency selector are mounted on the instrument panel for the pilot.

The whole gear weighs not over 25 lb. The transceiver has ten channels, each broken into ten codes, giving 100 signal frequencies for DME service. Frequency, code and identification are controlled automatically.

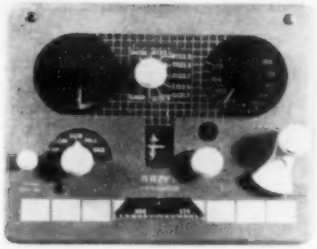
The equipment is all-electronic—its only moving part is the needle. It draws eight watts. The radar is crystal controlled.

▶ **New Superhomer**—As a companion piece for the small-plane market, an economy VHF set was exhibited for the first time for flyers who can't make a large capital outlay. It costs $495.

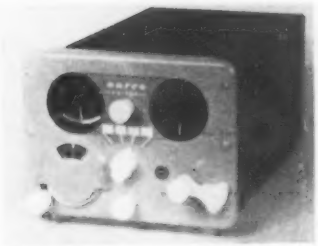
The set was developed by Narco after several years of field experience with its Omnihomer, which the new set, the Superhomer, will replace on the production line.

Narco engineers say that the Superhomer is the "first completely successful transition of really low-cost aircraft radio from the low frequency to the very high frequency realm." Some shortcomings in earlier sets, dictated by the low price limitation, have been circumvented in the new set by recent engineering developments, they report.

To Riddle, the Superhomer is "basic VHF, primarily intended to meet VFR (visual flight rules) rather than IFR (instrument flight rules) needs. It carries only the essentials for VHF communication and navigation. These are: Four-channel VHF transmitter, tunable VHF communication-navigation receiver, 108-127 mc.; left-right indicator (on-off course needle); to-from indicator; and receiver course selector. No



OMNIGATOR is Narco IFR standby . . .



SUPERHOMER is economy set for VFR.

ILS (instrument landing system) facilities are included.

A single 10-lb. box combines all components of the set and can be mounted on the instrument panel.

The company claims these improvements over the Omnihomer:

- **More accurate** course selection with new linear scale showing heading in wide spaced increments. Vernier control permits exact settings.
- **Double noise limiter** circuit added to reduce ignition interference. All circuits have been reworked and improved.
- **Improved tuner** for receiver.
- **More rugged** construction; longer-life tubes.

The Superhomer costs considerably less than the company's de luxe VHF set, the Omnigator, used in many corporate and private planes operated by "full-time" pilots who must fly in instrument weather.

The Omnigator has an eight-channel transmitter with a 5-w. output (compared to one watt for the lower-priced set), a tunable VHF receiver blanketing communication and navigation frequencies, and facilities for receiving VAR, 75-mc. marker beacon and ILS localizer signals. These are combined in an 18½-lb. box. The set is priced at $796.

Of about 8,500 planes equipped with low-cost VHF Omni, more than half are models produced by Narco, the company claims. The firm has no airline or military business. Until now it has aimed at the small-plane field—producing the lowest price VHF Omni on the market, Narco says.

Sales have risen steadily through ups and downs in the lightplane market. Production levels have been held steady. Narco's factory at Ambler has about 80 employes producing on the average about 160 sets each month for gross monthly sales of $65,000.

German Airports Get VOR Equipment

(McGraw-Hill World News)

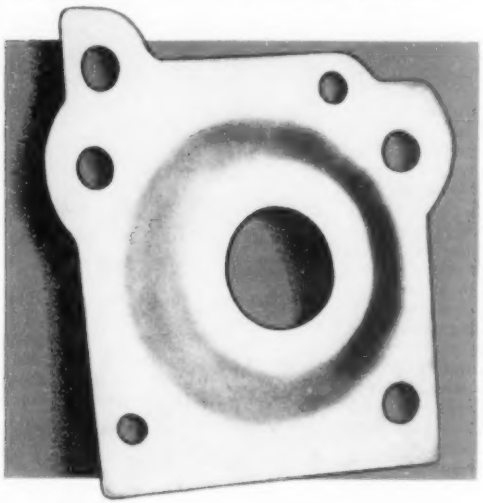
Frankfurt—Modern VOR installations are scheduled to be set up at the West German airports of Frankfurt, Munich, Nuremberg, Hamburg, Hanover and Dusseldorf during the next three months.

This decision was made by the high commission's Civil Aviation division after successful tests of VOR omnirange equipment at Stuttgart-Echterdingen airport this spring.

The new equipment will supplement present landing and navigation aids.

Because of its heavy air traffic, Frankfurt's Rhein-Main Airport will be equipped with two VOR installations.

The equipment was manufactured by the West Berlin firm of C. Lorenz A. G. with funds from the German federal government.



Announcing Cohrlastic diaphragm fabric

Orlon silicone coated

from −100° to +300° F

For the first time, Orlon*, the new industrial fabric, is now coated with silicone rubber to produce a new type of diaphragm material.

Cohrlastic 3500 is highly resistant to heat up to +300 and cold down to −100°F. It is impermeable, has excellent aging and dielectric properties, high tensile strength and outstanding flex resistance. It is an ideal diaphragm fabric for any application that must face severe temperature conditions.

*TM DUPONT

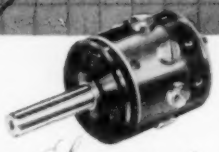
write for samples and data

Cohrlastic 3500 comes in rolls 36" wide and various thicknesses. It may be readily cut to any desired size or may be purchased in the form of completed diaphragms, either flat or convoluted.

THE Connecticut HARD RUBBER COMPANY

357 EAST STREET • NEW HAVEN, CONN.

potentiometers

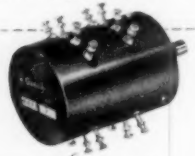


Syncromount

Linear and functional output, rugged construction, ball bearings, small size, low torque, synchro-type mount.

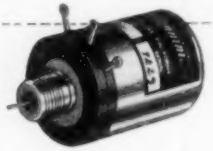
Rectipot

Push-pull motion, linear and functional output, high resolution, rectilinear potentiometer.



Gangpot

Functional and linear outputs, coils independently adjustable, variety of flexible assemblies.



Microtorque

Linear output, minimum torque, potentiometer and selsyn outputs, most ultra sensitive of them all.

These potentiometers are available in a variety of resistance values and circuits. For details on these and other fine instruments, write:

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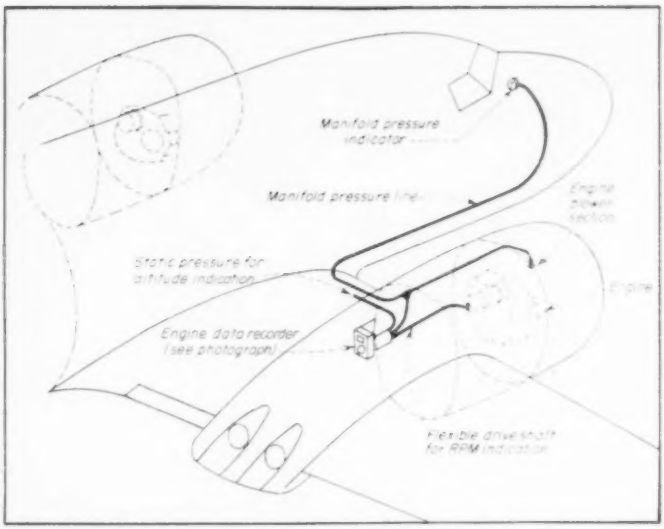


MOTOGRAPH engine data recorder (lower center right of diagram), as it is installed in a Swissair Convair 240. The unit is manufactured by Peravia, Bern, Switzerland.

Swiss Unit Gives Check on Engine

Details of a Swiss Engine Data Recorder have been supplied to AVIATION WEEK by Swissair's chief engineer, A. O. Baltensweiler.

The instrument, first tested in a DC-3 nacelle, records manifold pressure, rpm., and pressure altitude as a function of time.

The recording is registered on a 24-in.-wide roll of wax paper whose length permits 60 hr. of operation. The recorder is manufactured by Peravia, Bern, Switzerland. Name is Motograph, Peravia RD 244.

Baltensweiler says the recorder has been "of great help to our engineering personnel to investigate engine or propeller malfunctioning, to gather statistical data for performance analyses or to study new engine operating procedures."

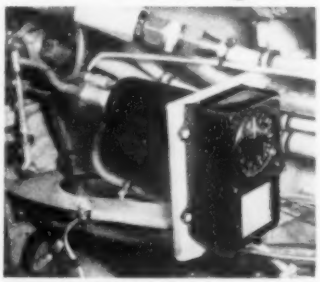
The instrument has been used also to make numerous studies concerning Convair 240 engine operation. Diagram at the top of the page indicates how the unit is installed in the Convair.

In addition to providing a permanent record of manifold pressure, rpm., and pressure altitude, Swissair cites these advantages for the Motograph:

Periodic analysis of engine power and time limits under such variables as take-off, climb and cruise (outside air temperature is obtained from flight logs).

• **Evaluation of rate of climb** or rate of descent (altitude differential versus time) at various altitudes.

• **Determination of total flight** time and/or engine time including taxiing and warm-up time.



DATA RECORDER shown mounted for operation. It was tested out in a DC-3.

At last fall's Champion Spark Plug and Ignition Conference, held at Toledo, British European Airways spoke favorably of the instrument, saying that "among other benefits, the records show whether crews follow prescribed procedures."

Johannesburg Readied for Comet

(*McGraw-Hill World News*)

Johannesburg—Work has been completed on a main runway at Jan Smuts Airport near here capable of taking the DH Comet and permitting the jet transport to take off fully loaded from this field which is 6,000 ft. above sea level.

The main strip is 10,500 ft. long,

Now another

OF OUR PRECIOUS NATIONAL RESOURCES

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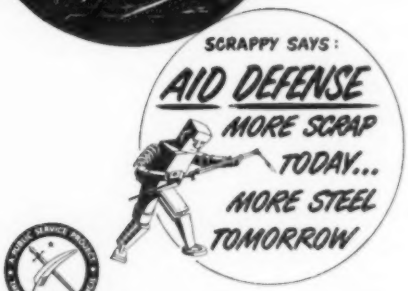

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Don't delay. The mills need 3000 carloads of scrap a day—every pound counts in this emergency!

NON-FERROUS SCRAP IS NEEDED, TOO!

This advertisement is a contribution, in the national interest, by

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An organization on the move needs a fast mover... We use Flying Tigers

RIGHT, MR. GALVIN. OUR SERVICE IS GEARED TO YOUR SALES, AND IT KEEPS WAREHOUSE COSTS DOWN.
HAPPY LANDING, BIRDMAN. ANOTHER L. A. JUMP?
ROGER. THEY MUST BE PUTTING MOTOROLAS IN EVERY ROOM OUT THERE!
THANKS FOR THE SERVICE, JOE. YOUR WAREHOUSE IS SURE ON ITS TOES.
WAREHOUSE NOTHING! FLYING TIGERS FLEW THESE IN FROM CHICAGO LAST NIGHT.
Motorola
WESTERN UNION
PAUL V. GALVIN, = MOTOROLA INC., CHICAGO = MODELS ARRIVED O.K. DEALERS HAPPY THANKS = C.T. NYSTROM KIERULFF & CO., LOS ANGELES

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200 ft. wide and can take aircraft wheel loads of 135,000 lb. Two subsidiary runways are being put in, 8,250 ft. long and 200 ft. wide.

Jan Smuts Airport covers some 2,130 acres and has cost approximately $10 million so far, with final expenditure estimated at over $17 million.

STAINLESS STEEL flexible hose is joined to manifold with new end coupling.

Coupling for Stainless Hose Saves Weight

A development which reportedly overcomes a major production headache in producing aircraft-type stainless steel flexible hose and saves considerable weight on engine hose installations and other airborne applications has been announced by the Avica Corp.

It is a specially designed hose end coupling which is mechanically attached rather than brazed or welded to the ends. The new coupling overcomes "one of the greatest problems today in hose manufacture, which is high temperature brazing or welding of very thin-walled flexible stainless steel hose to more robust end couplings," Avica says. Weight is saved by mechanical joining, since lighter metals, like aluminum alloy or titanium alloys, can be used.

The couplings can be detached from the hose and reused. Yet they provide a tight seal under high pressure.

The photo shows how they can be used to join flexible stainless steel hose to rigid tubing. Equipment shown is an all-stainless re-heat manifold developed by the firm. The manifold is subjected to pressures up to 1,500 psi. A novel saddle on the rigid tubing provides a means for attaching the flexible hose.

Avica specializes in design and manufacture of custom tubing for high-performance applications in military and commercial aircraft. Avica Corp., Portsmouth, R. I.

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*Reg. U.S. Pat. Off.

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FOR AIRCRAFT APPLICATIONS OF EVERY KIND

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High static pressure gauge or differential pressure switch . . . single pole, double throw.

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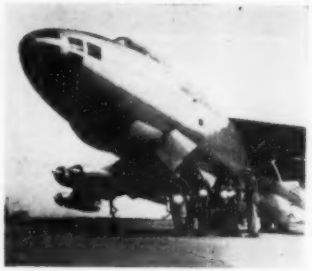

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YOU'LL say with pride, "I'm a *Boeing* engineer!" For Boeing men meet the highest standards and enjoy the prestige of engineering leadership. They work on such vital and challenging projects as guided missiles, supersonic research, the still-classified B-52 eight-jet heavy bomber, the six-jet B-47 medium bomber, and other revolutionary programs.

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Engineering opportunities at Boeing interest me. Please send me further information.

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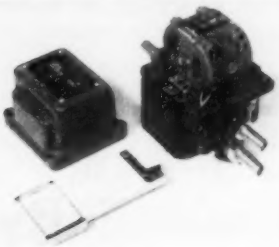


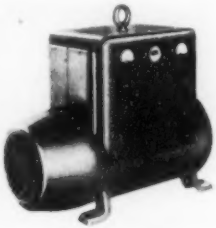
Servo Valve

A single-stage hydraulic servo valve for high-performance power servo systems has been developed by Midwestern Geophysical Laboratory.

A four-way type, the servo valve may be attached directly to the load actuator, producing a complete servomotor free of hydraulic lines from the valve to the load. The unit is designed for 200- to 3,000-psi. systems and weighs 5 lb.

Body and pistons are hardened, precision-lapped alloy steel, designed to insure against scoring and binding under dirty oil conditions, and changing valve characteristics under varying temperature conditions.

Midwestern Geophysical Laboratory, Tulsa, Okla.



Current for Planes

A new line of motor generator frequency changers designed to convert 60-cycle current into a 400-cycle power source accurate enough for aircraft and missile test work has been placed on the aviation equipment counter by Motor Generator Corp.

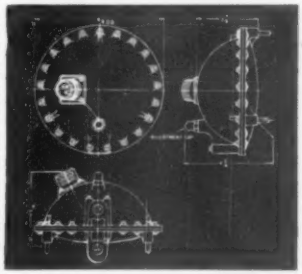
The sets, in 3-, 5-, and 10-kw. sizes, can be used for operating test instruments, functional testing of radio and radar systems, armament, for supplying power to control systems of missiles and rockets, and for any similar operation where 400-cycle current is needed.

Output voltage of the equipment is little affected by voltage fluctuations in the incoming power supply, according to the company. Regulation of

AEROTEC PRESSURE SWITCHES

HELP MAKE TODAY'S AIRCRAFT *Safer Than Ever!*

Greater safety for your planes is the goal of every Aerotec designed control. To cover every possible contingency, our instrument specialists have developed hundreds of different types of controls. Below are a few typical examples of Aerotec pressure switches covering a host of applications. Aerotec is supplying thousands of controls of these types to meet today's demands. They are playing an important part in raising the high standards of safety on commercial and military aircraft.



SENSITIVE LOW PRESSURE SWITCH SERIES P904

Differential Type for Ram Air
Sensitivity: 1/16" H_2O
Actuating Pressure Range: 1.50" H_2O to 3 psi with differential of 20% of applied pressure
Electrical Rating: 28 VDC 5 Amp. inductive
Complies with A.F. environmental specification 41065-B
For stall and flap warning applications and as safety switch for cabin de-icing heaters.

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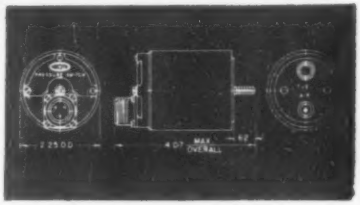
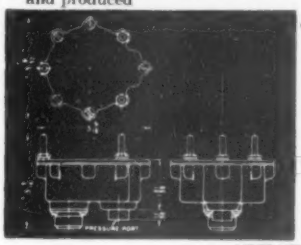
Gage, Differential, Types
Actuating Pressure Range: 2.5 psi to 200 psi
Mediums: MIL Fuels, hydraulic fluids, air
Electrical Rating: 28 VDC 3 Amp. inductive to 45,000 ft.
Complies with A.F. environmental specification 41065-B
Over 80 different types designed and produced





HIGH PRESSURE SWITCHES SERIES T100

Actuating Pressure Range: 200 psi to 5000 psi
Mediums: MIL Fuels, air, hydraulic fluids
Electrical Rating: 28 VDC 5 Amp. to 45,000 ft.
Temperature Range: −65° F. to +170° F.
Proof Pressures up to 7500 psi

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(If you prefer the West Coast, your application will be promptly forwarded to LOCKHEED at Burbank, Calif., where similar openings are available).

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output voltage is within 3%, while frequency regulation is within 5% of 400 cycles, no load to full load. Wave shape distortion is less than 5%, says the company.

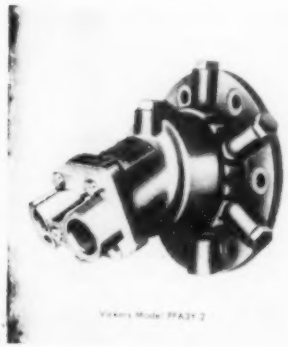
Compactly designed, the units are of two-bearing (ball) construction with the motor rotor, exciter armature and revolving field mounted on a solid steel shaft, dynamically balanced for quiet operation. The monitor top on the unit houses all controls.

Motor Generator Corp., Hobart Bros. Affiliate, W. Water St., Troy, Ohio.

Fire-Resistant Plastic

Flame-retardant laminated plastics suitable for circuit breakers and other aircraft equipment have been introduced by Synthane Corp. The flame retardant feature is available at little extra cost in all standard grades and forms of Synthane plastics, says the company.

Synthane Corp., Oaks, Pa.



Long-Life Pumps

Three new hydraulic pumps for aircraft, built to last 40% longer than previous models and to reduce airline maintenance problems, have been placed in production by Vickers, Inc.

The pumps, designated PFA2, PFA3Y-2, and PFA3Z-2, are fixed displacement piston-type designed for 3,000-psi. hydraulic systems. They meet the 2- and 3-gal. size requirements of AN-P-11b (at 1,500 rpm.) and already have been stamped with the seal of military approval, Vickers reports. One of the pumps, PFA3Z-2, has the same capacity as an old standby in airline and military planes, the PF17-3911-25Z.

A feature of the pumps is their small size and "extremely" high horsepower to weight ratio at rated performance. The PFA2 generates 1.9 hp. per pound of weight. As these piston pumps are fixed-displacement types, delivery is constant at a given drive speed, and

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INDIANA GEAR

The driven gear shown here is 5" in pitch diameter and 15" long overall. It is carburized and hardened with heat-treating distortion held within .001".

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varies directly with the speed. (Piston stroke in this type always is same, while in variable displacement pumps produced by Vickers, stroke can vary, depending on speed and system demand.)

Volumetric efficiency of the pumps is said to be 96% and overall efficiency 92%. The metered valve plate, developed a few years ago by the firm, is an integral part of the new pumps (older pumps are modified by kit). It reduces pulsations substantially and makes the pumps quieter than older types. Pumps can be fitted so they are interchangeable with older types.

Vickers, Inc., 1400 Oakman Blvd., Detroit 32, Mich.

Aircraft Connectors

A new line of electrical connectors to meet vibration, corrosion and high-temperature requirements of high-performance aircraft has been developed by Titeflex, Inc., 517 Frelinghuysen Ave., Newark 5, N. J.

The connectors are said to be shorter than usual, saving space. They eliminate clamps and the need for most right-angle connectors, according to Titeflex. The company reports that in recent tests "a Titeflex connector plug and mating receptacle were subjected to the equivalent of 120 hr. immersion in salt water without detectable absorption of moisture or salt, and with no decrease in the electrical characteristics of the connector."

The new parts are designed to permit quick, easy changes in wiring, and to speed production. Terminals in the connectors can be removed for soldering and crimping to wires, avoiding the need of working within a confined space in the unit. The connectors are provided in standard AN sizes.

Nautical Mile Rule

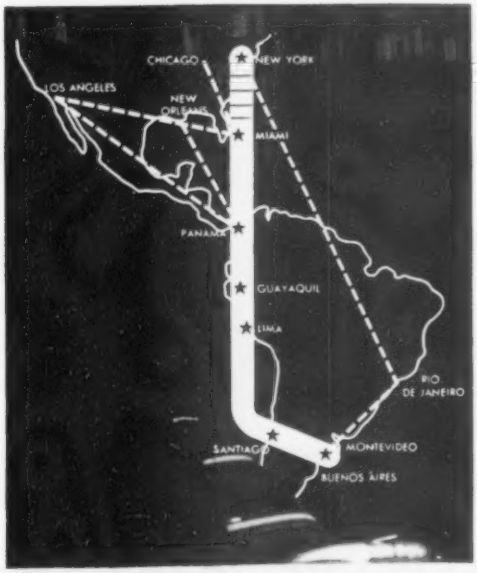
A new plotter for aerial navigation, conforming with recent adoption of the nautical mile as the military-civil standard, has been announced by Capt. P. V. H. Weems.

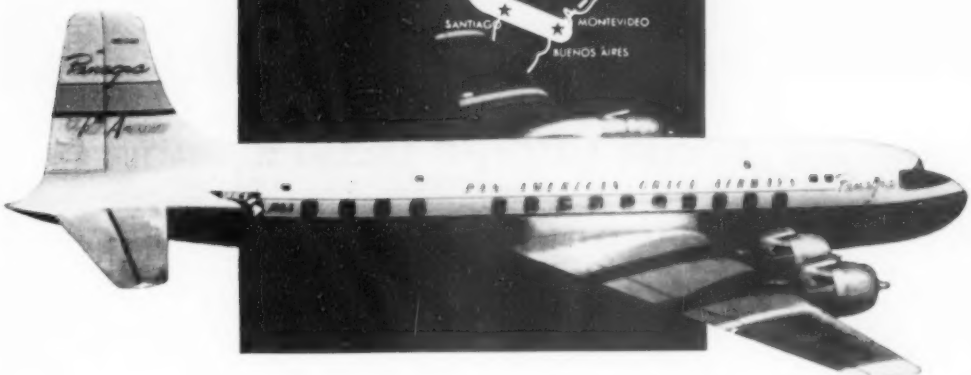
Called the Mark II-N, the new plotter is similar to its predecessor, the Mark II, with the exception of the nautical mile modification. And while primarily designed for nautical mile measurement, it also can be used for determining statute miles. This feature will appeal to many navigators who wish to convert to statute miles on Sectional and World Air Charts.

The new plotter also has an auxiliary protractor scale covering 40 deg. of arc, making it useful for measuring courses or bearings near 0 or 180 deg. The plotter is priced at $2.50.

Weems System of Navigation, Annapolis, Md.

Panagra specifies Janitrol





The friendly atmosphere in Panagra's luxurious DC-6 El InterAmericano is due, in part, to Janitrol heaters. Writes Thomas Kirkland, Panagra's vice-president, operation: "Their outstanding dependability has kept inspection time and replacements to a minimum. The units average 2350 hours of aircraft flight time. As a result Panagra has specified Janitrol heaters as standard equipment on its new DC-6B's." Thanks, Panagra! This outstanding airline is one of a great many who find it good business to specify Janitrol for dependability and economy on all new aircraft . . . For help on heating problems, wherever and whenever you need it, call your Janitrol representative.

AIRCRAFT-AUTOMOTIVE DIVISION, SURFACE COMBUSTION CORPORATION, TOLEDO 1, OHIO

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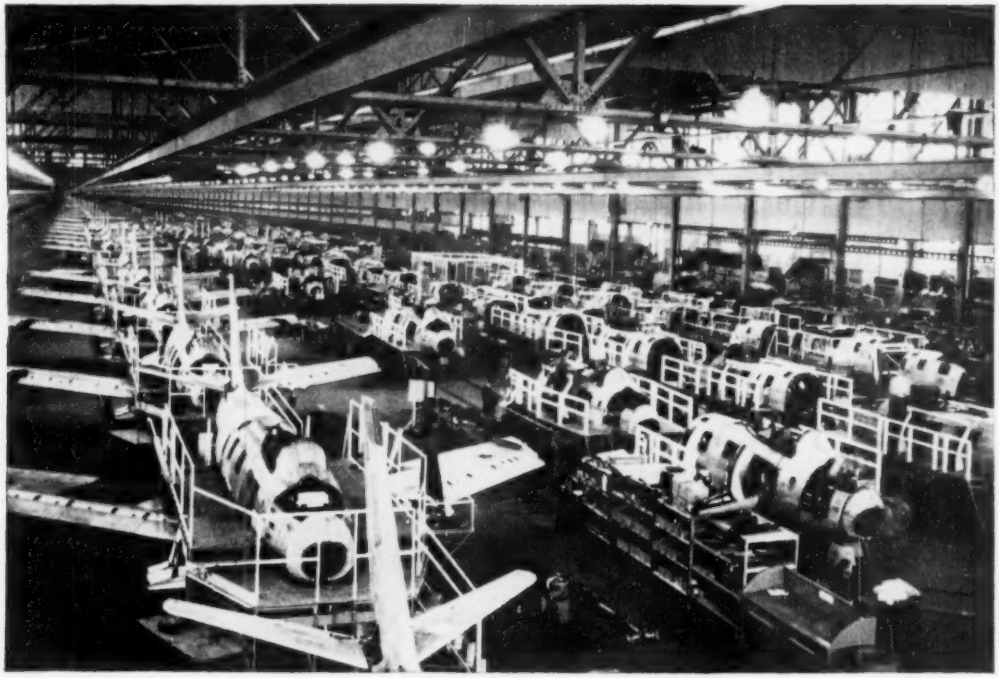

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Advantageous location . . . intelligent labor . . . material resources . . . top aircraft engineering knowledge . . . a demanding air force: these are the component parts . . . the factors that have contributed to making Canadair a major aircraft manufacturer.

Canadair benefits, too, from being in a country now a world military and civil aviation power . . . gains importance from the calibre of designers and engineers carefully chosen from many countries.

And Canadair has that all-important asset, experience: an established production record embracing airliners, military aircraft and training planes: *experience that counts with those buying aircraft.*

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CASE RUST

Final Mail Rates Near for All Trunklines

- **Board 'guarantee' under temporary setup is gone.**
- **But carriers can ask for rate hike in bad times.**

By next month CAB hopes every trunk airline and most locals will have a "final" mail rate.

That final rate means every dollar earned after taxes will belong to the stockholders. CAB can no longer take back past profits as it did under the "temporary rate" structure. But under the final mail rate system an airline need not go on losing money in bad times. It can still ask CAB for a raise.

This setup, therefore, might look like having your cake and eating it, too. But it's not that easy. The Board intends to be tough on airlines that try to use the system as a guarantee.

In the now-departing era of "temporary" mail rates, CAB pretty much guaranteed a "fair" (7%) return on investment. Only last year, for instance, the Board granted Northwest Airlines several million dollars of retroactive mail pay on its domestic system. That was to bail it out of what looked then like imminent bankruptcy. The Board claims it doesn't plan to do that again.

► **Not Retroactive**—If an airline blunders now, CAB may raise its mail pay—but not retroactively.

From now on, the airline earns what it can on its final rate. If earnings slip, it can "challenge" its existing rate and ask for a raise. If the Board agrees, it can grant some increase—but it's only retroactive to the date of the airline's challenge.

Here's how domestic and international lines stacked up last week on final and temporary rates.

- **Trunkline final rates:** American, Braniff (Post Office contesting), Capital, Chicago & Southern, Colonial (has challenged the present rate), Continental, Delta, Eastern, National (proposed), TWA, United and Western (proposed).
- **Trunkline temporary rates:** Mid-Continent, Northeast and Northwest.
- **Territorial:** All three major territorial carriers have final rates—Caribbean Atlantic, Hawaiian and TPA.
- **International final rates:** Colonial-Bermuda, Chicago & Southern, PanAm-Alaska and PanAm-Pacific are already on final rates.
- **International temporary rates:** PanAm-Atlantic, TWA, American-Mexico, Braniff, Eastern-San Juan, Panagra, and Northwest. Hearings on final TWA and PanAm-Atlantic rates are slated for September.
- **Local service final rates:** All-American (challenged), Robinson (challenged), Bonanza, Empire, Frontier (proposed), Helicopter Air Service, Los Angeles (challenged), Piedmont, Pioneer (challenged), Trans-Texas, Southwest (challenged), West Coast (CAB re-opened) and Wiggins.
- **Local temporary rates:** Central, Lake Central, Mid-West (certificate renewal denied), Ozark, Southern and Wisconsin Central.

It's too soon to say now how the final mail rate system will affect earnings of the majority of airlines—those depend-

Mail Pay for Domestic Airlines

Present and future mail rates of domestic trunklines and local service airlines are given in this complete listing, with effective dates. Actual yields during calendar 1951 are shown in the last two columns. Present and future rates are final, unless otherwise indicated by footnotes.

Trunklines

	NEW RATE		PRESENT RATE		1951 YIELD	
	Cents per ton mi.	Effective date	Cents per ton mi.	Effective date	Cents per ton mi.	Mail pay received (000)
American			45	1/51	44	$6,680
Eastern			45	1/51	40	2,245
TWA			45	1/51	45	5,367
United			45	1/51	38	6,888
Braniff	53	10/31(1)	87	4/49	87	1,321
Capital			53	10/51	50	1,170
Delta			53	10/51	57	998
National	53	1/52(1)	53(2)	7/51	95	1,087
Western	53	10/31(1)	59	1/49	84	1,212
	Cents per rev. mi.	Effective date	Cents per rev. mi.	Effective date	Cents per rev. mi.	Mail pay received (000)
C&S			11.21	10/51	14	1,203
Colonial			31.50(3)	4/51	22	812
Continental			13.00	10/51	18	1,189
Mid-Cont.			15.00	1/49	16	1,334
Northeast			25.72(2)	11/51	34	1,520
Northwest	53	1/52(1)(2)	25.00(2)(6)	7/51	33	1,988

Local Service Airlines

	NEW RATE		PRESENT RATE		1951 YIELD	
	Cents per rev. mi.	Effective date	Cents per rev. mi.	Effective date	Cents per rev. mi.	Mail pay received (000)
All-American			44.19(3)	1/52	58	$1,875
Bonanza	60	1/53(4)	70.00	10/51	60	625
Central	65	5/53(2)	80.00	10/51	74	1,031
Empire			53.00	1/49	49	607
Frontier	60.23	6/50(1)				
	69.00	2/52(1)	50.00(2)	9/51	56	2,509
HAS			149.25	10/51	137	511
Lake Central			50.00(2)	1/52	45	517
LAA			130.00	1/51	129	376
Mid-Cont.			29.85(2)	7/51	29	274
Mid-West			42.00(2)	12/50	49	281
Ozark	65	7/52(2)	80.00(2)	3/52	82	1,657
Piedmont			37.85	1/51	22	924
Pioneer			37.11(3)	1/50	28	1,081
Robinson			40.18(3)	7/51	80	1,150
Southern			50.00(2)	10/51	54	1,625
Southwest			33.49(3)	5/51	33	789
Trans-Texas			56.55	6/50	57	1,652
West Coast			57.99(5)	1/50	50	651
Wiggins			68.08	4/52	91	315
Wis. Cent.			56.00(2)	3/52	60	1,182

1. Proposed in CAB show-cause order. 2. Temporary rate. 3. Rate challenged by carrier, seeking a raise. 4. This rate is set. 5. CAB has re-opened this rate. 6. NWA rate is plus 2-0-2 grounding amortization. 7. "Present rate" for locals is actually a CAB-estimated "effective rate" based on a sliding scale involving load factors, miles flown.

SOURCE: CAB Rates division.

Airline Incomes

Net operating income (before income taxes and other adjustments) of trunk and local airlines for calendar 1951:

American	$29,730,572
Braniff	2,354,381
Capital	3,709,145
C & S	916,878
Colonial	(—205,417)
Continental	743,907
Delta	4,637,631
Eastern	19,482,811
Inland	303,766
Mid-Cont.	530,299
National	5,447,227
Northeast	389,275
Northwest	2,202,593
TWA	13,471,868
United	19,931,260
Western	2,293,361
All-Amer.	124,724
Bonanza	(—75,322)
Central	(—268,071)
Empire	34,350
Frontier	(—54,723)
Lake Central	(—173,490)
MCA	(—124,567)
Mid-West	20,868
Ozark	(—136,425)
Piedmont	245,893
Pioneer	235,948
Robinson	666,945
Southern	(—122,590)
Southwest	38,699
Trans-Texas	28,207
West Coast	184,121
Wiggins	39,087
Wisc. Central	(—10,454)

ing heavily on mail subsidy. Theoretically, an airline might ask a raise the first month that earnings outlook slipped below a 7% return on investment. That would "re-open" the final rate as of that date. This could in effect restore the security of the old temporary rate structure.

► **Profit Plan**—CAB and its rate-making staff look at the final rate plan's progressive, incentive side. They figure an airline will work harder to cut costs when it can count on keeping the profits. And Rate division Chief Irving Roth says the Board will frown on any airline that comes running in for subsidy just because it's had one bad month.

This year's first quarter has been the first real test of how final rates stand up when earnings slump. Expenses rose. Load factors dropped. By March the big airlines were clamoring for a fare increase—not mail rate increase. But Colonial and a few local lines have recently challenged their mail rates, since they depend heavily on mail pay.

The big lines got their $1 passenger fare increase last month, and most of them say the earnings outlook now is improving over the gloomy first quarter.

The Board hasn't acted yet on the few requests by smaller lines for revised final mail rates.

► **Capital's Case**—In between the big and little lines are a few borderline cases like Capital—a big line with some weak routes. Capital has indicated to the Board that if it hadn't been for the $1 fare increase, it might have challenged its final mail rate. This would have been the first case to date where a big line got in trouble on its final mail rate. But it didn't happen. Capital Treasurer Ray G. Lochiel says profits are shaping up with the spring upturn in load factors and the $1 fare increase.

And the CAB rate-making staff is hopeful about cost trends. So the newly established final mail rate structure may have weathered its first storm. The rates have stayed final—some for over a year.

Most airline earnings reported from now on are going to be final, except for minor tax and other adjustments. And that's regardless of bills pending before Congress to separate subsidy from compensatory mail pay. Subsidy separation, when and if it comes, need not change the total compensation.

And the airlines now getting mail pay on a ton-mile basis are theoretically free of subsidy anyway. When CAB starts setting an airline's mail pay at a ton-mile rate it means the Board figures that is the "compensatory" rate—the cost of handling and carrying each ton-mile of mail on that airline system.

Subsidy mail rates are paid on a revenue plane-mile basis on domestic routes and available seat-mile basis on international routes. That is because the mail pay is a subsidy for flights performed, without regard to mail service.

► **National's Final Rate**—In its recent tentative decision setting a final 53-cent rate for National Airlines, CAB illustrates the basic difference between final and temporary rates. National had asked the Board to make the 53-cent rate retroactive to last July 1 instead of only to this Jan. 1. But the Board decision indicated National's 53-cent temporary rate July-December of last year was excessive and therefore is subject to recapture.

Thus, the Board now has set the same final rate for National this year that it said was excessive last year. National can't keep the profits it made last year on temporary rates, but it can keep them from Jan. 1, 1952.

In the National decision, the Board also tried to clarify the difference between where it will pay a separate rate for an international route of a basically domestic airline. To get a separate rate for an international route, CAB said, it must be: big relative to the domestic route system; so big of itself that it obviously demands special treatment, and "more or less" independent of the domestic system.

National's Havana route doesn't meet those standards; it's really part of the domestic system, CAB said, and is therefore included in National's new overall 53-cent-a-ton-mile rate.

ATA's Low-Cost Omnirange Unit

International carriers primarily interested in new terminal facilities for local service airports.

Air Transport Assn. technicians have developed a low-cost $5,000-$7,500 terminal omnirange facility. Many airlines already plan to buy or build it themselves for instrument approach and navigation in areas now lacking more expensive modern equipment.

But they haven't had time yet to negotiate any contracts. Interested manufacturers include Collins, Federal, Maryland Electronics and Wilcox Electric Co.

► **Prototype in Use**—International airlines have expressed the most urgent need of it, although ATA engineers started the project primarily for local service airports. Pan American wants terminal omnirange for Monrovia, Liberia and other out-of-the-way areas—especially tropical areas where low-frequency radio performance is poor.

ATA's prototype has been in test operation at Baltimore's Friendship Airport since January. Ground tests indicate its new antenna design makes it more accurate than any other omnirange operated to date.

Yet its ATA-estimated production and installation cost is only $5,000 to $7,500, compared to $34,000 each CAA is paying Maryland Electronics for 12 CAA-specified terminal omniranges for 1952 (Aviation Week Sept. 3, p. 44).

► **Simpler Design**—Cost difference is mainly in CAA specifications calling for 24-hr. duty, indefinite life and elaborate continuous monitoring, a CAA spokesman says.

However, an ATA technician says the simpler ATA model has comparable dependability designed into it.

Major component cost differences between the two models lie in such items as a $600 transmitter vs. $4,500 and $500 monitor vs. perhaps $4,500. The new, more accurate $1,200 ATA antenna, however, costs more than the antenna ordered by CAA in 1950.

American Declares Early 1952 Dividend

American Airlines' load factor is improving seasonally this spring, but it is at a lower level than a year ago.

Despite the uncertain outlook, American's board of directors on Apr. 16 declared a 25-cent dividend, payable to common stockholders of record May 5. Timing of the declaration indicated to some observers that the directors are setting a dividend pattern that will permit paying either 75 cents this year or perhaps the same 50 cents as last year, depending on business developments. Last year's first 25-cent dividend was paid in June 1.

American's situation is significant because its monthly business often is a tipoff of industry trends.

Here's how American is doing as compared with a year ago, based on daily 12-city sample of its system load factor:

	1952	1951	Change in % Points
Jan.	69%	73%	down 4
Feb.	64%	74%	down 10
Mar.	69%	77%	down 8
Apr. (11 days)	73%	79%	down 6

American's total business volume is up, but the load factor is down because it has increased its fleet. American added 17 DC-6Bs last year. Available service isn't up that much this winter and spring because weather and the Newark Airport situation have lowered the company's operating factor significantly.

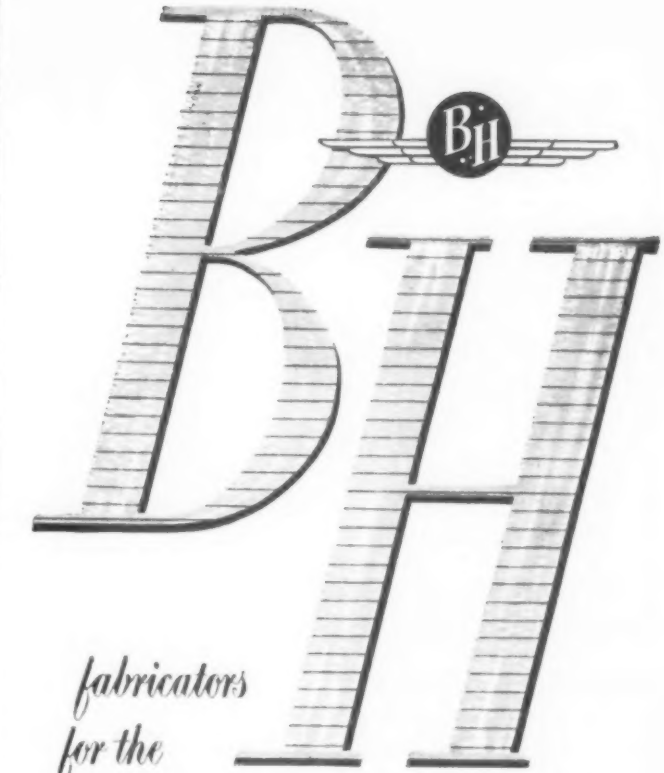
In its brief late in March urging CAB to increase fares, American estimated its first quarter net profit at $628,000, compared with $2,915,000 a year ago. Revenues were estimated at $39 million as against $34 million a year ago.

However, the picture apparently improved late in the quarter. American now reports to its stockholders a net profit of $948,834 for the first quarter, compared with adjusted 1951 profit of $2,450,000 the same time a year ago.

The recent $1 fare increase will yield American $2,500,000 more revenue the rest of this year, AA says. "This will partially offset increased costs," the airline says.

As to lower load factors, the airline announced optimism there, too. "Traffic on the system for April has been excellent and if existing load factors continue, there should be a substantial increase in earnings for the second and third quarters."

American has about $50 million worth of equipment on order for delivery by 1954. Financing method will depend on how earnings go the next year and one-half, which in turn is



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dependent on American's load factors.

▶**Capital Situation Same**—Meanwhile, Capital Airlines also has shown a healthy spring upturn in business. Capital's routes are not so strong as American's, so the load factors are lower. But the pattern of their January-April comparison 1951-52 is almost identical.

Here are Capital load factors to date:

	1952	1951	Change in % Points
Jan.	48%	53%	down 5
Feb.	46%	55%	down 9
Mar.	51%	57%	down 6
Apr. (16 days)	60%	61%	down 1

February was a bad month for American, Capital and probably all airlines serving the New York area. The series of crashes there is generally believed to have caused the slump. Also, February is generally a seasonal low because of weather and travel economics.

Air Safety Facing TV Antenna Problem

When Federal Communications Commission lifted the "freeze" on new television frequencies last month, aviation interests and TV broadcasters squared off for active "negotiations."

- How tall a TV tower is safe at what location?
- Who decides that question?

Construction of new ultra-high-frequency station antennas is bound to run into conflict with aviation safety at some locations. That's because UHF towers must be close to towns (as are airports); and they must generally be from 500 to 1,200 ft. tall.

CAA Planning Officer D. D. Thomas is now chairman of an Air Coordinating Committee group drawing up a formula for "safe" TV antenna location and height with regard to airports and airways. ACC will suggest such a formula to the FCC.

▶**Pilots Interested**—Air Transport Assn. recently suggested that Congress amend the Communications Act by empowering the FCC ". . . to refuse to issue or modify any license or construction permit when . . . after consultation with the CAA, the CAB, the Department of Defense, and the Treasury Department . . . there is reasonable possibility that they may constitute a hazard to air navigation."

Air Line Pilots Assn. is especially active in suggesting standards on which to judge TV tower safety.

ACC's Air-Space Subcommittee is now the official body representing aviation interests in FCC-sponsored talks with TV broadcasters.

But no matter what voluntary formulas they may agree on, one big issue remains: In case aviation-broadcaster negotiation over any particular tower location and height breaks down, who has the final say? The town, the state, FCC, CAA?

ACC Executive Secretary Charles Cary says that question has government lawyers stumped. Meanwhile, however, he looks for TV-aviation cooperation on devising general standards for broadcaster and FCC guidance in planning.

LAI Negotiates With Israel

(*McGraw-Hill World News*)

Tel Aviv—The future of LAI (Italian Air Lines) traffic to and from Israel hinges upon the success the carrier will have in working out a method of unfreezing at least a portion of the Italian line's blocked funds which have been accumulating in Israel since March, 1949. A conference to discuss the matter has been scheduled for Rome.

"If we cannot have our frozen amounts transferred we may discontinue our weekly flights between Lydda and Rome," LAI's local manager told McGraw-Hill World News. Should a favorable solution be worked out, the Italian carrier may increase its flights to three or four weekly.

The Rome negotiations are to cover granting of mutual facilities to LAI in Israel and El Al in Italy.

LAI plans to begin a new Lydda-Teheran weekly service this spring. This is seen as the beginning of an expansion move to serve Asia and the Far East.

KLM Traffic Up

(*McGraw-Hill World News*)

Amsterdam—Steady growth in KLM Royal Dutch Airlines' operations is apparent in comparison of last year's figures with those for 1950 (data for 1950 are in parenthesis): ton-miles, 139.5 million (117.1 million); passengers carried, 495,000 (416,000); tons of freight, 12,869 (10,284).

SHORTLINES

▶**American Airlines** reports Canadian customs has permanently approved preclearance of passenger baggage at Toronto—started experimentally by American this January.

▶**Civil Aeronautics Board** has delayed hearing of the nonscheduled airline investigation case until Aug. 11—at the nonskeds' request. The Board has consolidated the nonskeds' route certificate applications into the case, but only to the extent that they ask authority to give service "limited or controlled in

such a manner as to assure that it will be additional and supplemental to the presently certificated service and not a mere duplication of such service."

▶ **Eastern Air Lines** DC-4 landing accident at Miami on Sept. 14 was caused by inadvertent pulling of the wrong lever, raising the landing gear during landing roll. No one was hurt.

▶ **Flying Tiger Line** started "the first certificated, all-freight air service across the U.S. to the Pacific Northwest" last week; it is a daily Seattle, Portland, Denver, Chicago, Midwest, East Coast C-46 flight.

▶ **Northwest Airlines** March load factor of 60% compares with 49% a year ago, and revenue passenger miles jumped 43% to 47,069,736.

▶ **Pan American World Airways** San Juan DC-4 crash hearing by CAB is scheduled for May 5 in the Public Amusement and Park Administration Building, San Juan.

▶ **Pioneer Air Lines** passenger miles the first quarter were up 11% over a year ago—to 10,089,138. Number of passengers gained 14% to 39,172. Air cargo increased 18% to 53,980 ton-miles. Mail gained 19% to 24,928 ton-miles.

▶ **Southern Airways** has won its court fight vs. Continental Southern Lines, a bus company that sought to prove illegal the CAB order awarding Southern its routes in the "reopened Mississippi Valley case" in 1950.

▶ **Trans-Canada Air Lines** plans to start service to Germany about Nov. 1, having won traffic rights from the Civil Aviation Board of the Allied High Commission. Permit gives TCA rights from Montreal to Duesseldorf and Hamburg.

▶ **United Air Lines** has withdrawn its application for CAB approval of an increased "family plan" fare from half price to three-quarters fare. United hoped other lines would go along with its fare increase proposal, but had to retract when competitors stuck to the lower fare. . . . Has bought for $40,000 three sets of mockups showing Convair-Liner mechanical and electrical systems—for employe training. . . . Company has extended its VHF radio-telephone communications system to the Midwest and Northwest.

▶ **U.S. Airlines** Jamaica, N. Y., C-46 crash hearing by CAB is slated for May 6 at the Lexington Hotel, New York City.

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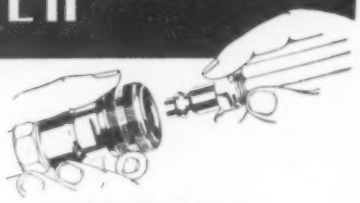

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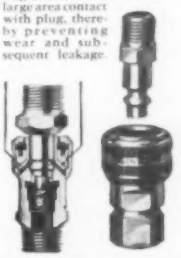

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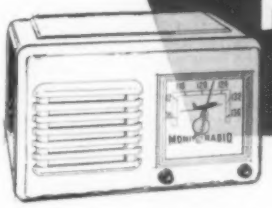

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RA-4079, Aviation Week
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This page appeared in the December 3rd issue of Aviation Week. It is a story worth repeating.

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P-3059, Aviation Week
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P-4118, Aviation Week
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FN-3812, Aviation Week
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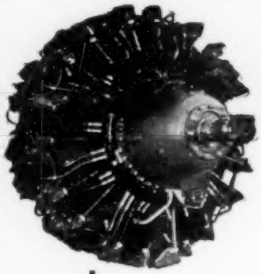

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PLUS MANY OTHERS

43 PIECES

ENGINE QUICK CHANGE UNITS APPLICABLE TO GRUMMAN FM-1 AIRCRAFT. COMPLETE WITH ACCESSORIES

MISCELLANEOUS COMPONENTS

Quantity	Part No.	Mfg.	Description
45	AN4103-?	Clifford	Brass (Valve #U4785) Oil Cooler
38	18597-?	Airsearch	Aluminum Oil Cooler
120	MF9-713-15A	Vickers	Hydraulic Pump
700	YFD 8600	Thompson	Fuel Booster Pump
125	D7818	Adel	Anti-icer Pump
50	2P771-A	Pesco	Fuel Booster Pump
250	AN4014	Erie Meter	Wobble (D-3) Pump
300	1H260-K & KA	Pesco	Hydraulic Pump
19	AN5531-1	G. E.	Tach. Generator
1000	AN5780-?	G. E.	Wheel & Flap Position Indicator
400	AN5780-?	Weston	Wheel & Flap Position Indicator
16	76B19	Lewis Eng.	Cyl. Head Temp. Gauge
10	46B2	Lewis Eng.	Air Temp. Ind.
31	47B21	Lewis Eng.	Temperature Ind.
12	47B22	Lewis Eng.	Temperature Ind.
90	47B23	Lewis Eng.	Temperature Ind.
36	47B24	Lewis Eng.	Temperature Ind.
10	76Z9	Lewis Eng.	Air Temp. Ind.
11	76B4	Lewis Eng.	Temperature Ind.
20	77C4	Lewis Eng.	Temperature Ind.
21	77C5	Lewis Eng.	Temperature Ind.
85	787TY79Z9	Weston	Left Wing Anti-Icing
88	787TY73Z9	Weston	Right Wing Anti-Icing
83	787TY74Z9	Weston	Tail Anti-Icing
11	2227-11D-3A	Eclipse	Dual Tachometer
44	5BA25DJ4B	G. E.	DC Motor (½ HP)
83	A4934	Delco	Motor
50	RDB2220	Holtzer Cabot	DC Motor
115	PACA2A	Parker	Primer
70	AN3213-1	Scintilla	Ignition Switch
450	A-9 (94-32926)	Nasco	Ignition Switch
687	RS-?	Mallory	Selector Box
90	JH950-R	Jack & Heintz	Starter Motor
492	S-841 (94-32953)	Electronic Labs	Box
53	AN6203-3	Bendix	Accumulator 10"-1500 P.S.I.
1000	13018-A	Bendix	Interphone Box
140	K14949E	Marquette	Windshield Wiper Kit
188	EYLC-2334	Barber-Colman	Control
11	19086-1C	Eclipse	Amplifier
174	450-0	Skinner	Gasoline Filter
250	558-1A	Eclipse	Oil Separator
100	716-3A	Eclipse	Generator (NEA-3A)
37	117-47	Edison	Detector
89	318	Edwards	Horn
20	794-F	Stewart Warner	Heater
230	921-B	Stewart-Warner	Heater (200000 BTU)
340	981280	Kidde	Co? Cylinder
85	19924-?	Adel	Lock Valve
90	923748	Kidde	Oxygen Cylinder
80	DW28	Eclipse	Transformer
97	6041H-146A	Cutler Hammer	Relay (B-12)
22	0655-D	Aro	Oxygen Regulato
148	PG908AS1	Minn. Honeywel	Air Ramp Switch
33	DW47	Eclipse	Transformer
11	DW33	Eclipse	Transformer
65	ASDC?	CO? Mfg. Co.	Fire Detector
600	ND21	American Gas Accumulator Co.	Time Delay Relay
30	U6005-DV5	United Air Prod.	Oil Temp. Reg. 5°
89	UA-3160	United Air Prod.	Oil Temp. Reg. 6°
95	UA-3160C	United Air Prod.	Oil Temp. Reg. 6°
73	UA-6007-CF-DV5	United Air Prod.	Oil Temp. Reg. 7°
14	UA-6009-S-30	United Air Prod.	Oil Temp. Reg. 9°
11	UA-6012K-S30K	United Air Prod.	Oil Temp. Reg. 12°

CARBURETORS! MAGNETOS! SPARK PLUGS!

Quantity	Part No.	Description
247	PD12K10	Stromberg injection Carburetor
19	1375F	Holley carburetor
407	SF9LN-? (manufacturer's part No. 10-12453-6 Spec AN9511)	Bendix Scintilla Magneto
42	SF5RN-12 (manufacturer's part No. 10-26170-1)	Bendix Scintilla Magneto
185,000	LS4AD1	Spark Plug (Aero)
30,000	LS-659A	Bendix Scintilla Spark Plug

SPECIAL GROUP!

Ideal for tear-down for parts

Quantity	Part No.	Description
328	PD12K10	Stromberg injection carburetor
236	PR48-A1	Stromberg carburetor
89	PR48-A2	Stromberg carburetor
31	PR48-A3	Stromberg carburetor

PRATT AND WHITNEY AIRCRAFT ENGINE PARTS

Quantity	Part No.	Description
166	1045A	Bearing
500	3506	Flange
130	8288	Follower Ass'y
814	35814	Blower Ass'y
53	48362	Shaft
175	48363	Shaft
56	48392	Sump
390	48461	Gear
78	76236	Gear
1178	84589	Bearing
113	84487	Housing
77	84591C	Nose Housing
200	48350-D	Crankcase Ass'y
200	84083	Cylinder
100	84084	Cylinder
200	84085	Cylinder

HUGE STOCKS OF ALL TYPES *AN* HARDWARE NEW — UNUSED. WRITE FOR DETAILED LISTINGS.

BEARINGS AIRCRAFT

Quantity	Part No.
18000	K3L-?
8600	K3L-R48
4000	KF4
3000	KF4H
30000	KP4R16-?
3300	KSF5
17000	BC5W11
28000	KS6A
7000	38KD4
6600	RE3MR3
5000	F35-14

ACTUATORS

Quantity	Part No.
42	400AJ3
161	420 EC
160	420 DY
12	M-2031 (Air Associates)

★ ***Send us your material lists for screening!***

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COMMERCIAL SURPLUS SALES CO.

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Pilot Error or Publicity Error?

Public confidence is important to aviation. People must trust the airplanes and operating personnel as well as the regulations and controlling government bodies. The aviation industry suffers considerably when this confidence is lacking. Admittedly it is a difficult problem to maintain public confidence in the face of the recent series of accidents, especially those in the heavily populated areas of New York and New Jersey. But it must be done.

► **Committees vs. Councils**—It is no secret that the industry is worried. A host of high-level committees has been established in an effort to deal with the situation. These include Presidential, congressional and industry committees. Apparently these august bodies have had little effect on the citizens who continue to organize their own groups at an even faster rate. An example of the sentiments of some of these is found in the title of the newly formed "Queens Council for the Elimination of Airports in the City of New York."

The last crash in New York, a U. S. Airlines C-46 near Idlewild, illustrates one reason for lack of public support. The accident occurred on a Saturday morning at 8:30 during bad weather. Possible causes of the mishap are numerous: mechanical trouble, instrument failure, pilot fatigue, lack of visual aids, confusing regulations, complicated procedures or many other things could have done it.

► **Sensational Banners**—Within 36 hours however, these were the headlines in some New York newspapers:

Daily News: HINT PILOT ERROR IN QUEENS CRASH
Daily Mirror: CHARGE PILOT IGNORED ORDER
Herald Tribune: QUEENS CRASH BLAMED UPON PILOT'S ERROR

Presumably there were other equally sensational banners which this author failed to see. A safe guess is that some ten million people were convinced that a reckless pilot caused the trouble.

Confidence in the entire pilot profession received a blow from this. The newspaper reader must also have wondered what kind of airline management permits such irresponsible people to operate airplanes and how come the government condones this lawlessness. The work of the "high-level" committees will also be hurt. "After all," the citizen will reason, "what can help aviation when the pilots won't even do as they are told."

In brief, these blazing headlines hurt everyone connected with aviation.

► **CAB's Role**—It is amazing therefore, to learn the origin of these headlines. They were given to the press by the CAB! The Director of Public Information, CAB, told newsmen that the pilot had "apparently not followed instructions" from the Idlewild tower.

This statement does not appear to be true. The pilot made an ILS approach and was circling to the left to land. This was both legal and proper. When he could not maintain contact the tower advised him to make a right turn. During the attempt to follow instructions the plane crashed. It should be noted however, that the validity of the statement in no way lessens its harmful effects.

A second, and equally sinister, problem in this matter concerns the revelation of CAB thinking. A verdict of pilot error was brought in almost immediately. Many pilots are wondering now if all subsequent investigation will be aimed at proving this rather than finding the real cause.

Pilot error in itself is the most flimsy of excuses and publicity of this sort is indefensible. It shakes public confidence in aviation and industry's confidence in CAB-CAA. Responsible officials who believe that pilot error is a satisfactory explanation for crashes have no business in aviation.

STRICTLY PERSONAL

Incidental Intelligence

Alex McSurely's story in AW Apr. 14 on scarcity of engineers in the CAA Office of Aviation Safety was reprinted in the Congressional Record Apr. 23. . . . We hear from Capitol Hill that there is little chance CAA will ever get any higher annual appropriations in the future than it has in past years. There is **dissatisfaction with CAA** in one or two vital committees in Congress that may lead to thorough overhauling of the agency—perhaps involving CAB too. . . . An airline pilot says we would be "astounded" to learn the confirmed number of cases of **ILS failure**, both in the cockpit instrument and the ground transmitter. What's CAA doing about it? . . . No subject **Ace Robson** has covered has brought as much mail as his angry words against the **change to nautical miles (knots)**. Most of the proponents are military pilots. Ace repeats, every pilot group in the U. S. voted against it—airlines, private pilots of AOPA, Flying Farmers, Corporation Aircraft Owners Assn. "These pilots are not against change; they are against chance. But over the objections of every civilian air group, these changes were railroaded into existence," he contends.

* * *

Reflections
On Employment Vicissitudes
of Aero Engineers and the Stretchout
By David (Bard) Anderton

When the project's done, and the money's gone,
The mechanical engineer
Can design a tool, or a swimming pool,
And eat for another year.

When Congress hacks with economy's axe,
An electrical engineer
Turns eager hands to the broadcast bands
And financially stays in the clear.

Come the hard, hard times in these frigid climes,
Aeronauticists feel the pain
As they cast an eye at the deep, blue sky.
Who the hell **needs** a rocket plane?

* * *

Let's Read Fairchild's Mail

Gene Henkel sends us the best of the hundreds of letters from kids that Fairchild Engine division has received:

> Dear Sirs: Would you please send me some pictures of airplane engines and jet engines if possible because in our school I'm not doing so hot in science and our science teacher was a pilot in the war and knows something about airplanes so if possible would you send me some pictures because I want an A.
>
> FRED MARSHALL
> Sutton, Mass.

* * *

Note to Some of Our Readers

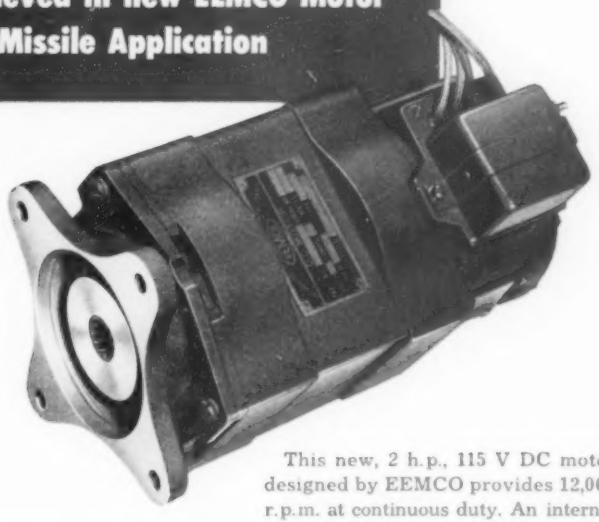
Dear Readers:

We are sorry some of you report your AVIATION WEEK comes one to three days late some weeks. Our printers put them into the mail the same day every week but we never know when they'll come **OUT.** Blame the P. O.

THE EDITOR

EEMCO technical bulletin

High Performance – Compactness Achieved in new EEMCO Motor for Missile Application



This new, 2 h.p., 115 V DC motor designed by EEMCO provides 12,000 r.p.m. at continuous duty. An internal spline drive within armature shaft allows for a close coupled, extremely compact assembly, to drive a 400 cycle, 3 phase permanent magnet alternator. Provision is made in motor winding to maintain constant output speed with varying conditions of voltage and load. Unit is equipped with radio noise filter.

EEMCO designs for the future in cooperation with the leading producers of aircraft and guided missiles. Our specialty and responsibility is to provide practical solutions to the actuator and motor problems of tomorrow's aircraft.

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3-512

New, More Powerful Allison Jet Engines Put Added Sting in the Scorpions

THE NORTHROP SCORPION F-89C -- newest all-weather jet interceptor for the Air Force—gets a big power boost from two new Allison J35 engines.

With take-off thrust in the new J35-A-33 engines greatly increased over previous models in the F-89 series, the Scorpion remains the highest-powered interceptor in production in the world today.

This increased power from the improved Allison engines gives the aircraft faster take-off—higher rate of climb—even with heavier fire power and radar equipment.

Pilots now pack a special Sunday punch in their round-the-clock patrol for any intruders approaching our shores.

Today, Allison engines are depended upon *exclusively* to power the interceptors which guard our shores—a demonstration of confidence based on the unequalled experience of more than 1,300,000 hours in the air—*more time, under all conditions, than all other jet engines combined.*

GM
GENERAL MOTORS

Allison
DIVISION OF GENERAL MOTORS
INDIANAPOLIS, INDIANA

Builders of J35 Axial, J33 Centrifuga Flow Turbo-Jet Engines, T38 and T40 Turbo-Prop Engines.